Call-A.P.P.L.E.

Volume 8, Number 2
February 1985

Worlds Largest Apple User Group

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Which DOS Will Be Your Valentine?

INSIDE:

- Road Maps to Apple II Disks: 4 Operating Systems
- ProDOS HELP Program
- Spreadsheet Data Analysis
- PLUS: New Products, A.P.P.L.E. Doctor, and more. . .

Apple PugetSound Program Library Exchange

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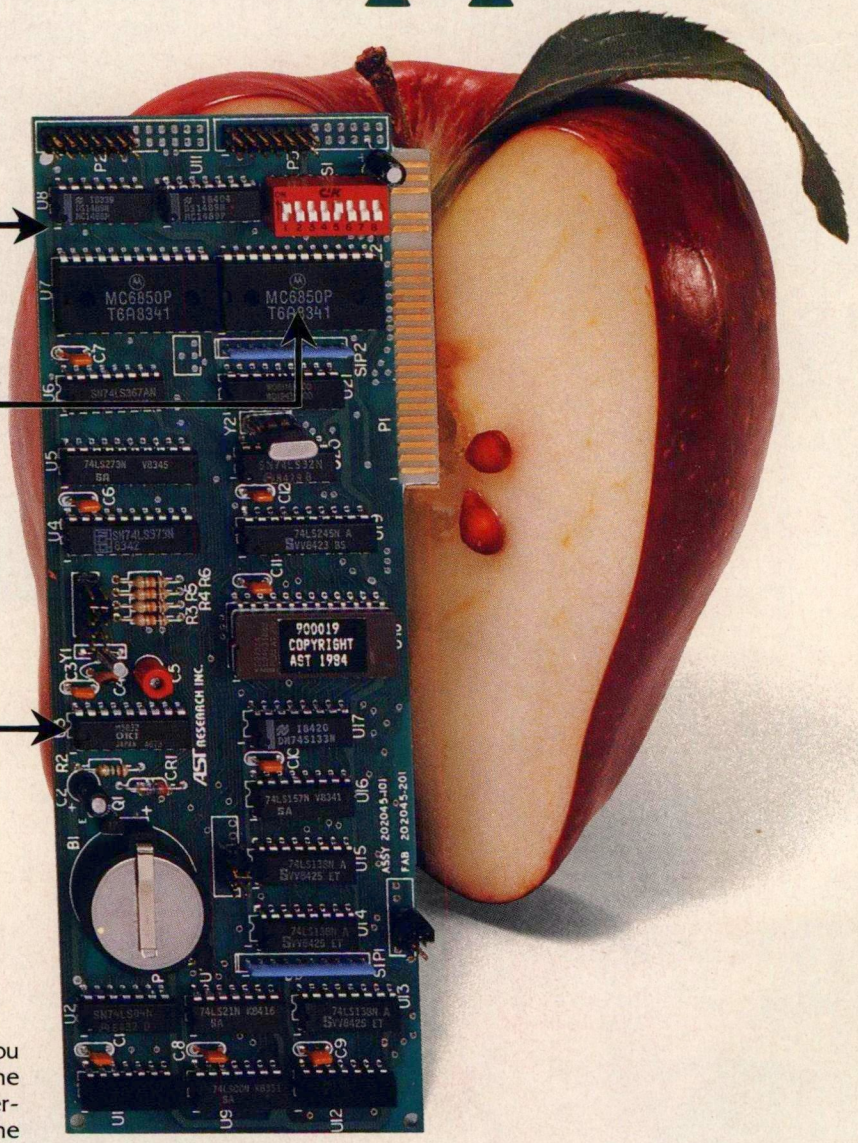
Printer Serial Port

Terminal/ Modem Serial Port

Clock Calendar



At AST, we are consistently thinking of ways to help you get the most out of your personal computer. We set the standard with enhancement products for the IBM Personal Computer, and now we are striving to do the same for Apple™ computers.

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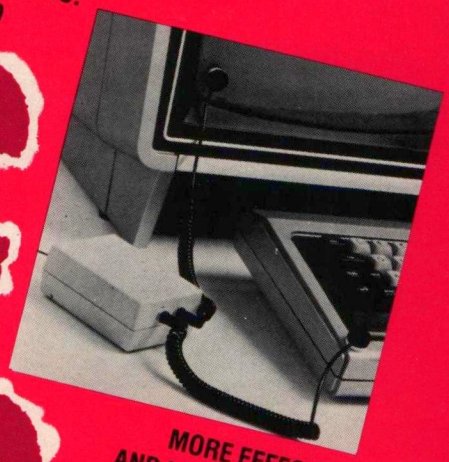

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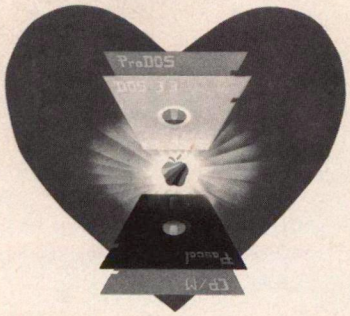
About the Cover



This month's cover design, created by Mary Hubert, suggests that the Apple *II* can assume several colorful — and loveable — personalities. With at least four operating systems to choose from, which one(s) can win your heart?

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APGRAPHICS/GRAPHICS BUILDER	SPGPPH	$25.00	0 6
AP FILE	SAPF	$18.50	0 2
APMAIL II V3.0	SAM3	$25.00	0 3
APMAIL.PRO	SAPMPR	$35.00	0 3
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APPLESOFT PROGRAM EDITOR	SAPE	$30.00	0 4
AP TEST	SAPT	$18.50	0 2
BIG MAC.C	SMACC	$40.00	1 0
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DICE	SDIC	$12.50	0 2
DIRECTORY TITLE WRITER	STITWR	$15.00	0 2
DOLLARS AND $ENSE	SDAS2E	$75.00	2 0
DOLLARS AND $ENSE	SDAS2C	$83.50	2 0
DOLLARS AND $ENSE	SMCDAS	$112.00	2 0
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ELF ABC	SELF	$15.00	0 2
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HIGHER FONTS 1	SHFI	$13.00	0 2
HIGHER GRAPHICS II	SHIGRA	$15.00	0 8
HIGHER TEXT PLUS	SHTP	$27.50	0 4
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MODEM MAGICIAN	SMODMA	$38.00	1 0
MULTI-TREIVE	SMUL	$50.00	0 9
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THINK TANK	STHITK	$119.00	1 0
THE FRIENDLY COMPUTER	SFRCOM	$27.50	0 13
TITLE MASTER	STITMA	$20.00	0 8
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ZARDAX III	SZARDA	$160.00	2 0
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III CHEERS (QUARTERLY ISSUE)		$12.50	0 1
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VOLUME 3 (JAN-JUN 80)	SA3	$12.50	0 1
VOLUME 4 (JUL-DEC 80)	SA4	$12.50	0 1
VOLUME 5 (JAN-JUN 81)	SA5	$12.50	0 1
VOLUME 6 (JUL-DEC 81)	SA6	$12.50	0 1
VOLUME 7 (JAN-JUN 82)	SA7	$12.50	0 1
VOLUME 8 (JUL-DEC 82)	SA8	$12.50	0 1
VOLUME 9A (JAN-MAR 83)	SA9A	$12.50	0 1
VOLUME 9B (APR-JUN 83)	SA9B	$12.50	0 1
VOLUME 10A (JUL-SEP 83)	SA10A	$12.50	0 1
VOLUME 10B (OCT-DEC 83)	SA10B	$12.50	0 1
VOLUME 11A (JAN-MAR 84)	SA11A	$12.50	0 1
VOLUME 11B (APR-JUN 84)	SA11B	$12.50	0 1
VOLUME 12A (JUL-SEP 84)	SA12A	$12.50	0 1
PASCAL ANTHOLOGY -1 (JAN-DEC 81)	SPA1	$12.50	0 1
DISK OF THE MONTH 01/84	SMO184	$11.00	0 1
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SOFTWARE

PRODUCT NAME	CODE	PRICE	LBS.OZ
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DISK OF THE MONTH 07/84	SMO784	$11.00	0 1
DISK OF THE MONTH 08/84	SMO884	$11.00	0 1
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DISK OF THE MONTH 11/84	SM1184	$11.00	0 1
DISK OF THE MONTH 12/84	SM1284	$11.00	0 1

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FARWORD	SFARWO	$12.50	0 2
GRAFMAGIC	SGRAFM	$12.50	0 2
GRAPHICS BUILDER	SGRABU	$12.50	0 2
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MICROWRITER II +	SUWTR+	$12.50	0 2
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VOLKSFILER	SVOLKS	$12.50	0 2
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ZAPT	SZAPT	$12.50	0 2

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CRITICAL MASS	SCRIMS	$15.00	0 3
DISKPAK 7	SD7	$17.50	0 2
EAMON SERIES	SEAMON	$5.00	0 2
FLY WARS	SFLYWS	$15.00	0 4
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JELLYFISH	SJELLY	$15.00	0 2
LA TRIVIATA	SLATRI	$27.50	0 6
MICROBE	SMIC	$30.00	1 0
MINOTAUR	SMINOT	$15.00	0 2
MUMMY'S CURSE	SMCU	$12.50	0 2
PATH TACTICS	SPATH	$27.50	0 13
PENSATE	SPENST	$28.00	0 3
PLASMANIA	SPLASM	$15.00	0 3
REPTON	SREPTN	$15.00	0 3
SNAKE BYTE	SSNABT	$15.00	0 2
SARGONVANIA	STRA	$25.50	0 4
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AP COOL KIT	HAKK	$25.00	2 0
AP DRIVE	HAPD	$205.00	6 0
AP.LCASE 1	HLC1	$30.00	0 2
AP.LCASE 1 w/DICE	HLCIA	$37.50	0 3
AP.LCASE 2	HLC2	$25.00	0 2
AP.LCASE2 w/DICE	HLC2B	$30.00	0 2
APPLESURANCE	HAUD	$85.00	1 0
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APPLE III DISK DRIVE	HDR3	$285.00	6 0
BASF 3.5' MICRO-FLOPPY (BOX 5)	HBASF	$22.50	0 7
DISK BANKS	HDBA	$4.50	1 0
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100 - GENERIC DISKETTES	HGEN10	$125.00	5 0
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DRIVE ADAPTOR IIc	H2CCBL	$15.00	0 3
FLASHCARD 288K	HSSD	$525.00	2 0
FLASHCARD 144K	HSSS	$345.00	2 0
FLASHCARD 144K UPGRADE KIT	HSSU	$200.00	0 2
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KOALA TOUCH TABLET	HKOA2C	$95.00	2 0
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LIS'NER 1000: Phonetic Speech Synthesis Upgrade	HLISVR	$75.00	1 0
MAC COVERS	HMCCVR	$25.00	2 0
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MACH III JOYSTICK	HJOMA3	$49.00	1 0

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MOCKINGBOARD	HMOB2C	$165.00	3 0
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MULTITECH MODEM	HMODPC	$399.00	5 0
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PRINTER RIBBON - TALLY MT 180L	HTRI	$17.00	1 0
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PIXY PLOTTER 3 PARALLEL INTERFACE	HTPIP	$299.00	18 0
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5-BLUE	HPLBLU	$10.00	1 0
5-RED	HPLRED	$10.00	1 0
5-GREEN	HPLGRE	$10.00	1 0
1 EA. GREEN,VIOLET,BROWN ORANGE,PINK	HPLPEN	$10.00	1 0
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5-BLUE	HPNBLU	$12.50	1 0
5-RED	HPNRED	$12.50	1 0
5-GREEN	HPNGRE	$12.50	1 0
1 EA. GREEN,VIOLET,BROWN ORANGE,PINK	HPLPTR	$12.50	1 0
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REPEATERRR	HRPT	$25.00	0 5
SERIAL INTERFACE ADAPTOR CABLE 2c	HSERC	$17.50	0 6
SERIAL INTERFACE ADAPTOR CABLE Mac	HSERM	$17.50	0 6
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w/1' FEMALE SERIAL CABLE	HVRC3F	$160.00	2 0
w/1' SERIAL CABLE	HVRC3M	$160.00	2 0
6' PARALLEL CABLE	HVPC	$20.00	0 4
6' FEMALE SERIAL CABLE	HVSLF	$20.00	0 4
6' MALE SERIAL CABLE	HVSLM	$20.00	0 4
1' FEMALE SERIAL CABLE	HVSSF	$20.00	0 2
1' MALE SERIAL CABLE	HVSSM	$20.00	0 2
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ZARDAX KEYBOARD CONNECTOR	HZARKY	$7.00	0 5
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A.P.P.L.E. T-SHIRT (MEDIUM)	HTSHM	$5.00	0 5
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Call -A.P.P.L.E. NOV/DEC 80	MN-D80	$2.00	0 8
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Call -A.P.P.L.E. JULY 83	MJUL83	$2.50	0 8
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Call -A.P.P.L.E. SEPTEMBER 83	MSEP83	$2.50	0 8
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Call -A.P.P.L.E. APRIL 84	MAPR84	$3.00	0 8
Call -A.P.P.L.E. MAY 84	MMAY84	$3.00	0 8
Call -A.P.P.L.E. JUNE 84	MJUN84	$3.00	0 8
Call -A.P.P.L.E. JULY 84	MJUL84	$3.00	0 8
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Call -A.P.P.L.E. NOVEMBER 84	MNOV84	$3.00	0 8
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THE GUIDE	PWW2	$8.00	2 0
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   (Sorry, we do not accept COD or Purchase Orders on individual memberships)

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8 "	9.50	12.79
9 "	10.50	13.97
10 "	11.50	15.15
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12 "	13.50	17.51
13 "	14.50	18.69
14 "	15.50	19.87
15 "	16.50	21.05
16 "	17.50	22.23
17 "	18.50	23.41
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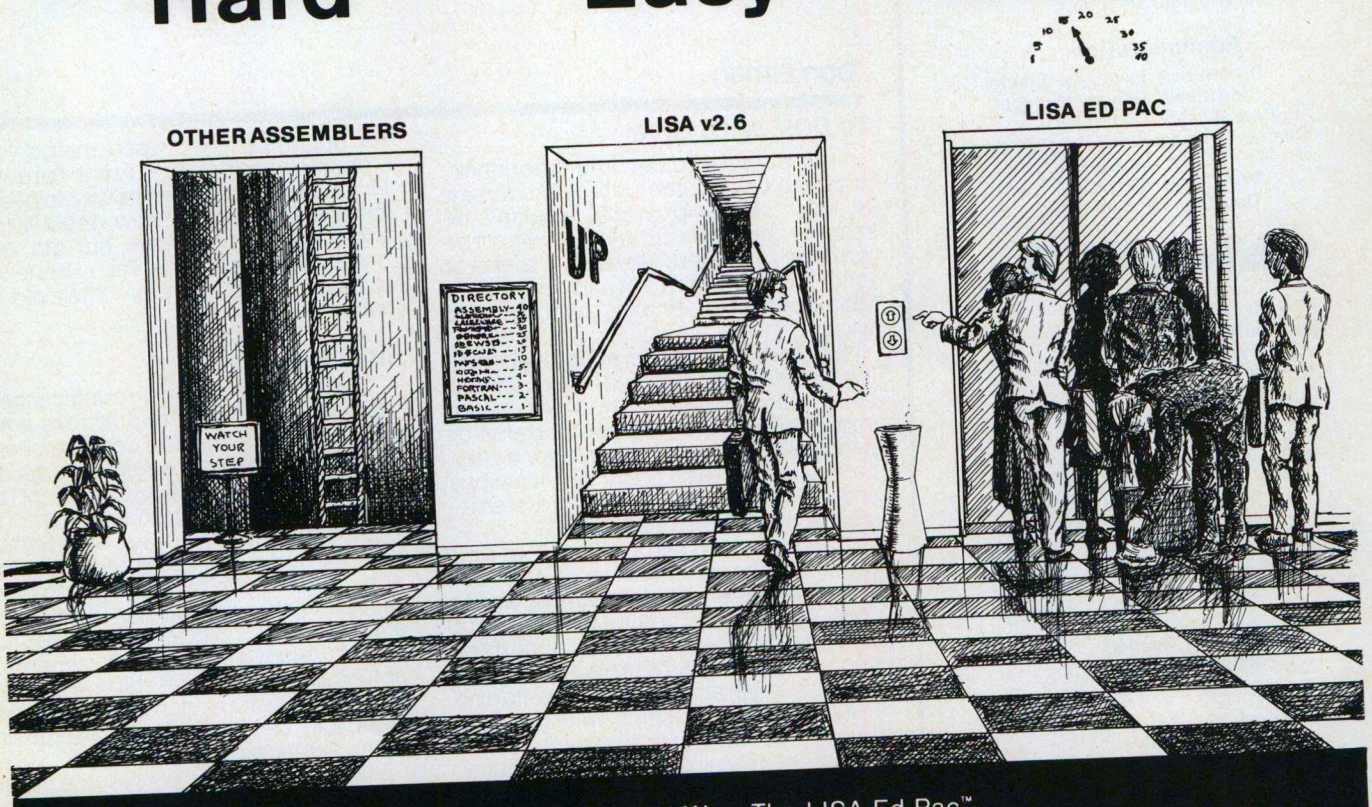

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You can't deny that learning assembly is extremely important for you if you want to make the most of your work. If assembly language wasn't so important, why are almost all of the top selling programs available for the Apple II written in assembly language? But let's face it, learning 6502 assembly language isn't a piece of cake. At least not until now. Because now there's the LISA Education Package™ from Lazerware. It'll have you up to speed with assembly language in a fraction of the time it would otherwise take.

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The INNER CIRCUIT

My Funny Valentine
by Charlie and Susan Stillman

My darling, six years now it has been
since first I admired you, a beauty so fair.
We grew inseparable, some say it's a sin.
Yet it's your mind I adore, your intellect rare.

I knew I must have you, touch you, you see.
Now you're no longer ravishing, but worry not dear—
I would never forsake you, that could never be.
We have travelled too far, I still need you that's clear.

Yes, SHE knows! They say love triangles doom one to wrath.
Nay! Rejoice dear Valentine—my wife loves you too!
For her finances, her word-processing, even her math.
Your appeal is still growing, my dear Apple II.

Don Elman

To DOS, With Love

Is it possible to become emotionally attached to your computer? Of course it is! Most of you probably wouldn't be reading this, and I certainly wouldn't be writing it, if there weren't a sense of long-term commitment and devotion to that box full of circuits, switches, and wires.

Yet, love for another entity—whether it is a person or a machine—is not limited to its mere physical components. More important are the behavior patterns or personality of the love object. For a computer, much of that core of individuality is embodied in its disk operating system—affectionately referred to as DOS.

The chameleon-like Apple II, as you know, can operate in at least four different DOS incarnations. The most widely used, DOS 3.3, reached its present state of maturity after a traumatic youth of stepwise progressions. Apple and other vendors have also made available the venerable CP/M, which had become standard in many office settings.

A more recent option is Apple Pascal, which allows—in a somewhat awkward and memory-eating way—the use of a structured programming language that had been developed on larger machines. Finally there is ProDOS, which Apple introduced in 1983 as a streamlined system for utilizing the increased memory and storage capacities of current hardware. ProDOS appears well on its way to becoming the standard for new Apple II users and software developers, but can sometimes cause problems for experienced users as they try to break their old DOS habits.

In This Issue

Given this often-confusing range of choices, we present two articles which may help you make the best use of your Apple. In **Road Maps to Apple II Disks**, S. C. K. Hunter favors us with one of the clearest, most comprehensive tutorials on disk formatting that we have seen. By systematically discussing the similarities and differences in how data is stored on a 5-inch floppy with DOS 3.3, CP/M, Pascal, and ProDOS, this article can provide much of the insight you'll need for switching among them. If you are still trying to test the ProDOS waters, perhaps you'll find a lifeline in Ken Kashmarek's useful program, **Extended Help for ProDOS**.

Later in the issue we resume Jeffrey Jacques' series on statistics using THE Spreadsheet, along with our usual array of columns and up-to-date information. Finally, when February 14 comes around, don't forget to let your computer know how you feel. ♥

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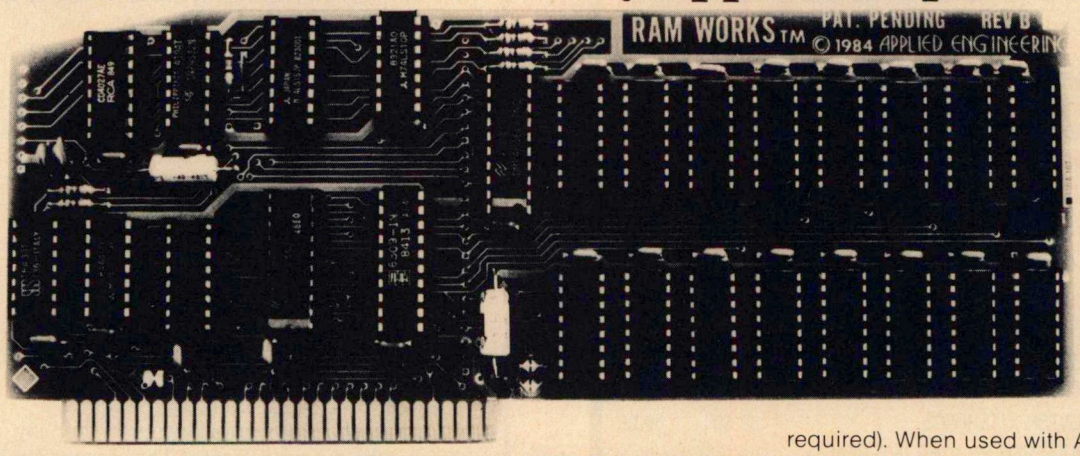

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MICROSOFT MULTIPLAN (APPLE CP/M, II, //E, //C, MAC)	195.00	129.00
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ACSII EXPRESS PROFESSIONAL	129.00	85.00

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Prices and specifications subject to change without notice.
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California residents add 6% Sales Tax.

MEMBER BILLBOARD

FEBRUARY 1985

We've Moved!

Last month we said we'd do it and we've really done it. A.P.P.L.E. is now thoroughly settled (more or less) into our new headquarters in Renton, Washington. Some of you astute old-timers may recall that our office had also been in Renton a long, long time ago (two years or so), before moving to the spacious Kent facilities. Don't worry, we have not taken a step through a backward time warp. Our newest office is in a different and, we think, nicer part of town than the previous ones. Specifically, we're in the Koll Business Center between S.W. 43rd St. and S.W. 41st, about one block west of Highway 167. The address and main phone number are:

A.P.P.L.E. CO-OP
290 S.W. 43rd St.
Renton, Washington 98055
(206) 251-5222

Why Not?

Anyone who has ever experienced the "joy" of moving may well ask: why did we relocate? The reasons are both simple and complex. First, we know that the closer we are to the majority of local members, the better we can serve you with regard to meetings, classes, and walk-in purchases. This move brings us into better proximity with our many members in the greater Seattle area.

The second reason is a bit harder to explain, but equally important in the long run. Have you ever bought a pair of shiny new shoes that had a little extra room in them? As nice as they might look, you may find them to be a constant source of irritation as your feet rattle around inside.

Similarly, our attractive Kent facilities were more than adequate for our current operational needs. Yet, the spaciousness of the office area often seemed to hamper our operations, as considerable time was spent running from one end to the other while tracking down some vital information. We also began to question the wisdom of paying for rent and heat in a warehouse that was twice as large as necessary for housing our inventory of software, peripherals, and magazines. When a local company expressed interest in taking over our lease, we decided to take the opportunity to look for a home that would be a better "fit" with reduced overhead expenses—and were fortunate to find one!

Moving Pains

Few things in life go as smoothly as planned, and our move was no exception. We had scheduled the physical relocation to take place during the year-end holidays so that order processing and member services could continue without any noticeable interruption.

Unfortunately, we found that time of year to be less than ideal for coordinating the transfer of telephone service, the disconnection and reinstallation of our central computer, and the necessary electrical and carpentry work for our new offices. Combined with the mixed blessing of a larger-than-expected number of product orders, these circumstances caused unavoidable delays in filling many orders. To make matters worse, there were several days in late December and early January when it was difficult, if not impossible, to reach us by phone.

We are enormously grateful for the patience exhibited by those who were affected during the temporary disruption. Now that it is all behind us and things have returned to relative normalcy at A.P.P.L.E., we are beginning to appreciate the many valuable lessons which have been learned—but we don't plan to use them too soon.

SCRG PRODUCTS FOR THE APPLE COMPUTER

SWITCH-A-SLOT

$179.50

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

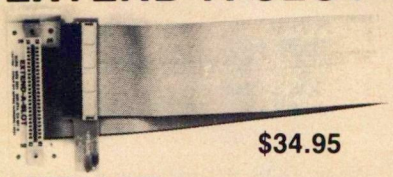
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.

New—resistive terminations for better response

SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards. These products may be incompatible with some alternate processor cards.

EXTEND-A-SLOT



$34.95

The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

Owners of large numbers of I/O expansion cards—keep your frequently used cards installed. Use the EXTEND-A-SLOT for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

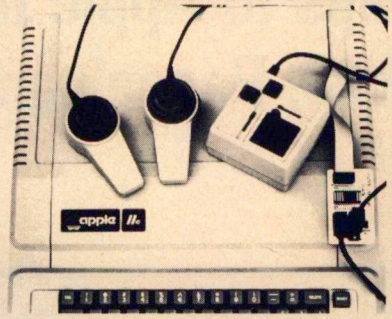
OTHER PRODUCTS

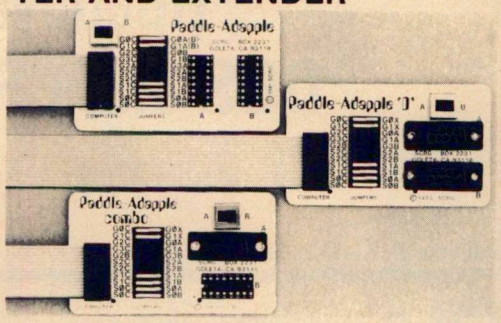
D Manual controller. Gives complete control over the $C000 through $C0FF range in hardware. Can be switched while program is running. $89.50.

MAGIC KEYBOARD (for][or][+ only). Re-encodes the keyboard to give alternate keyboards, such as DVORAK, ASK, 10-KEY, HEXIDECIMAL KEYPAD, etc. $49.50.

Paddle-Adapple

GAME I/O ADAPTER AND EXTENDER





- Works with all Apple compatible joysticks, paddles and other I/O devices.
- Select one of two devices or . . .
- Use 4 paddles simultaneously.
- Unique "Jumpers" socket allows you to configure to meet your needs.
- BPI™ users can have BPI™ device and paddles plugged in simultaneously. (**Paddle-Adapple** and **Paddle-Adapple Combo** only).
- Gives you four push-button inputs.
- Supports shift key modification.
- Exchange X & Y joystick axis.
- Small and compact — adheres to computer with supplied foam tape.
- All Strobes, annunciators and power available on all 16 pin connectors.
- Supplied with 18" cable.

$29.95

The **Paddle-Adapple** has two 16 pin sockets

The **Paddle-Adapple "D"** works with the subminiature D connectors.

The **Paddle-Adapple Combo** has one 16 pin socket and one subminiature D connector.

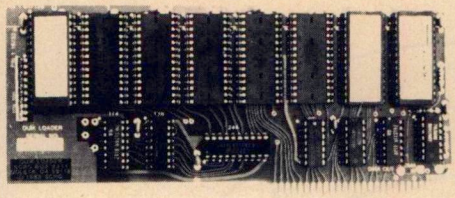
NEW 9-16 Adapter

For Apple / /e and / /c

This product permits the use of most 16-pin I/O devices with the APPLE //c or //e. By plugging this adapter into the sub-miniature 'D' connector, you can plug in a 16-pin device, such as the Paddle-Adapple, paddles, joystick, KOALA PAD™, etc. The only limitations are those devices that use the annunciators or the C040 strobe, such as the POWER PAD™. Please note that the //c does not support four joystick inputs.

$14.95

quikLoader™



FAST AND CONVENIENT

The quikLoader is the *fastest* way to load programs. **BAR NONE!** Programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog in either direction.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

PROGRAMMING EPROMS

Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer such as the **PROmGRAMER.** For APPLESOFT, INTEGER, or single machine language files, no programming knowledge is necessary. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

If you have a program that is valuable, it will become **more** valuable when it is instantly available to you. We are actively seeking licenses from software publishers to allow their popular programs to be made available for the quikLoader. Independent authors are encouraged to write programs suitable for the quikLoader. If the author wishes, we will market the program (with appropiate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

We start your library of programs with the most popular utilities on the card, FID and COPYA. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

We are currently licensed to sell several very popular programs on EPROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for DOUBLE—TAKE is $45.00. This includes the program exactly the same as you would buy it at your dealer for $34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about $25.00). COPY][PLUS cost $65.00. This includes the original program (worth $39.95) and **two** programmed 27128's.

Other programs available directly from us or the publishers are, **BARKOVITCH I/O TRACER AND SINGLE STEP TRACE, MICRO/TYPOGRAPHER** from **TIDBIT SOFTWARE, ECHO** speech synthesizer software from **STREET ELECTRONICS,** and **MERLIN** assembler, from **ROGER WAGNER PUBLISHING.** More commercial programs are now in the works.

MEMORY CAPACITY

The quikLoader has eight sockets for EPROMs. These sockets can accommodate standard EPROMs from 2716 to 27512. These types can be freely intermixed. The memory capacity of the quikLoader depends on the EPROMS used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive,but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the quikLoader becomes a 64K ROM. Using larger capacity EPROMs allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the quikLoader operating system supports multiple quikLoaders.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ABOUT THE DESIGNER

The quikLoader was designed by Jim Sather, author of UNDERSTANDING THE APPLE][(forward by Steve Wozniak), published by QUALITY SOFTWARE (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

SYSTEM REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

DOS, INTEGER BASIC, FID, and COPYA are copyrighted programs of APPLE COMPUTER, INC. licensed to Southern California Research Group to distribute for use only in combination with quikLoader.

$179.50

PROmGRAMER™

The **PROmGRAMER** will read or program any of the standard single-volt EPROMS from the 2708 to the 27512. Features include:

- Slot independent operation for the APPLE // family of computers.
- Zero insertion force sockets accepts 24 or 28 pin devices.
- Disk based software allows easy customization of software.
- Complete instructions for loading software into quikLoader.

$149.50

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SIX MONTH WARRANTY
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TOLL-FREE ORDER LINES

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all other states (Including AK, HI, VI & PR)
Information & technical questions: (805) 685-1931

Road Maps to Apple II Disks: DOS 3.3, CP/M, Pascal, and ProDOS

Skillman C. Kim Hunter

ZAP programs, such as A.P.P.L.E.'s *ProZAP*, can be used to read files on any Apple II disk, regardless of which disk operating system was used to write the disk. Since each of the four systems now available for the Apple II use entirely different ways of storing files, locating a file can be confusing. Although numerous articles have been published that discuss separately the way DOS 3.3, CP/M or Pascal each store files, relatively little has yet been published on ProDOS (other than the excellent ProDOS manuals from Apple). I prepared some maps that help me find my way quickly by showing the various disk storage methods in a common format.

Figure 1 shows a map of disk sector ordering. The inner ring is numbered in order from 0 to F and is denoted as the PHYSICAL SECTOR order. These physical numbers are placed on disks in a *header* section that preceeds the sector data.

It's Only Logical

Because of delays in processing each sector as it is read, data is never stored in the physical sector order. To speed up file operations, a LOGICAL SECTOR order is used that results in the data being stored in sectors that are separated by a fixed or nearly fixed number of sectors. Figure 1 shows the logical sector orders for DOS 3.3, CP/M, Pascal, and ProDOS, respectively, in the four rings around the inner ring of physical sector numbers.

Most Zap programs are written primarily for one of the Apple disk systems and have the LOGICAL–PHYSICAL sector translation built in. As a result, if you try to read a file on a CP/M disk using a Zap program designed for DOS 3.3, it appears that the file sectors are scrambled on the disk. You'd need something like Figure 1 to unscramble the sectors.

The second ring from the center, labeled "DOS 3.3," shows the logical sector order used by that system. The DOS 3.3 code contains a table, located at $BFB8, to translate the logical sector into the physical sector. The table lists as follows:

```
*BFB8.BFC7
0DB97531ECA8642F
DOS 3.3 sector
0123456789ABCDEF
```

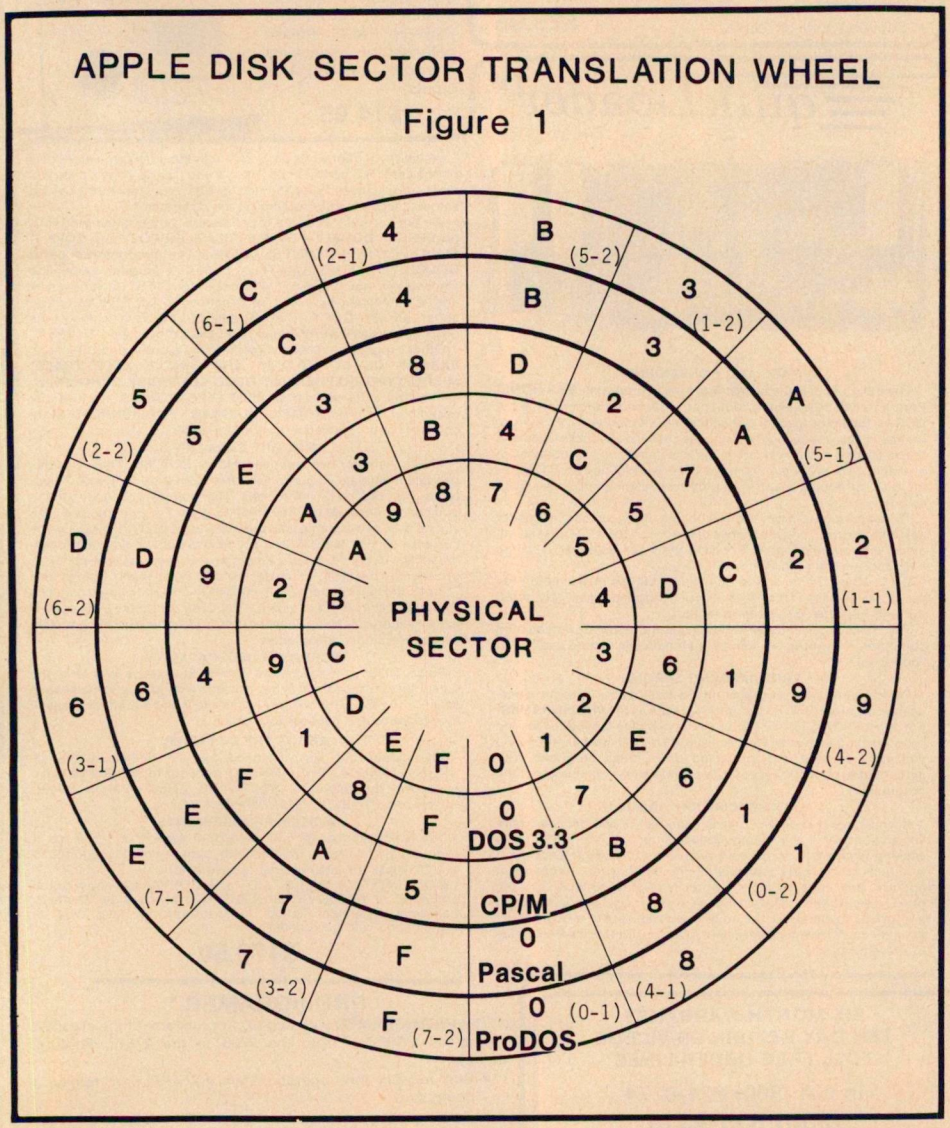
When DOS 3.3 receives a request to read "Sector 7," a table look-up is performed and the eighth number, "1," is extracted. This tells DOS 3.3 to read physical sector 1. Note that this table is the inverse of the physical/logical order shown on Figure 1. This inversion is often a source of confusion in using disk zap read/write programs.

Looking at the other rings in Figure 1, while DOS 3.3 puts logical sector 1 on physical sector D, CP/M puts logical sector 1 on physical sector 3. Apple Pascal and ProDOS both put logical sector 1 on physical sector 2. Note that the sector arrangement for Pascal and ProDOS are identical (not by chance, since many folks at Apple are enamored with Pascal), so ProZAP can be used to read Pascal disks with no sector translation.

In the outer ring on Figure 1—the ProDOS ring—there are numbers in parentheses: (0–1), (4–1), etc. These are ProDOS block numbers. ProDOS uses two-sector blocks to store files and counts the blocks

APPLE DISK SECTOR TRANSLATION WHEEL

Figure 1



Beagle Bros Apple® Software Report

"All the News That Fits"

Ad Number 201 — *Spring 1985*

Utilities

D CODE™ NEW!

$39.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

PROGRAM PACKER: D CODE squeezes every wasted and unused byte out of your programs to save valuable memory space and increase program speed and efficiency. Combine lines, shorten variables and/or remove REMarks. Also locate wasted code that can't possibly be executed.

PROGRAM PROOFREADER: Errors are caught as you type. Scan entire programs to uncover potential crashes.

SUPER TRACERS: When your program stops or crashes, ask to see the last 10 (or up to 10,000) statements that were executed, giving you an instant *history* of your program. "Live" tracing too, with each executing statement and current variable values printed in a sealed-off text window.

MORE: Set up de-bugging "breakpoints" so your program stops when you want. Search for strings and variables, *fast*—Almost any program can be searched in about 2 seconds!

GPLE™

$49.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

GPLE is Beagle Bros' "GLOBAL PROGRAM LINE EDITOR". It works like a word processor for your Applesoft program lines:

INSERT AND DELETE characters and words in your programs. No more awkward "cursor-tracing" to make changes.

SEARCH AND REPLACE: Find every occurrence of a string or variable in your programs. Or *replace* any word with any other. For example, change all X's to ABC's, or all "Horses" to "Cows".

FUNCTION KEYS: Define your own Apple "function keys". ESC-1 can Catalog drive 1, ESC-N can type your name, etc.

DOUBLE-TAKE™

$34.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

2-WAY SCROLLING: Listings and disk Catalogs scroll up *and* down, making file names and program lines easier and faster to find. Change scroll-direction with the Arrow keys. Machine language listings and Hex-Ascii dumps scroll two-ways too.

BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *fast* program tracing and de-bugging.

```
A$="ABC"      ◄ VARIABLE-DISPLAY: Instantly prints all
X=3.14159       of your program's variables in the order
Y=255           used, with their current values
A$: 5 10 150  ◄ CROSS-REFERENCE: Alphabetizes every
X: 10 20 3000   variable your program uses, and displays
Y: 5 40 55 60   them with their line numbers
```

Plus **AUTO-LINE-NUMBER**, new improved Re-Number, Hex-Dec Converter, Program Stats, eliminate or re-define the cursor...

```
10 TEXT: ? CHR$(21): HOME:
   POKE 33,7: REM Replace the
   periods in line 20 with spaces.
20 PRINT ". @@@@@ . @@ . . .
   @@@ . O . O . @@ . . ^ . . @
   ( . . - . - . = = = = * . / . . . . \
   . ASCII . . ANNIE"
30 C=C+0: N=N+1: POKE 1539,
   173+16*C: FOR X=1 TO 9:
   POKE 1542+X, N+X: S=PEEK
   (49193+X): NEXT
40 IF N-246 THEN 30
```

10 TEXT: HOME: FOR P=0 TO 255: VTAB 1: NORMAL: PRINT "POKE 243,";P: POKE 243,P: LIST: NEXT: REM *Try replacing the 243's with 50's*

BEAGLE BASIC™

$34.95 (Compatible with Apple IIe or 64K II+/DOS 3.3)

BETTER APPLE BASIC: Put Applesoft in RAM so you can change it. Adds new commands like ***Else, Swap, Tone...***

DOS BOSS™

$24.00 (Compatible with any version of Apple II/DOS 3.3)

CHANGE DOS: Change *Catalog* command to *Cat*, or *"Syntax Error"* to *"Oops!"*, or anything you want. ***Protect your programs:*** An unauthorized Save-attempt can print "Not Copyable". List Prevention, other useful tips and fascinating experiments. DOS Boss will teach you a *ton* about Apple programming!

SILICON SALAD™

$24.95 (Compatible with any version of Apple II/DOS 3.3)

100+ PROGRAMS: ***Program Splitter*** makes room for hi-res in big programs, ***Disk Scanner*** finds bad sectors, ***DOS-Killer*** adds 2 disk tracks, ***2-Track Cat*** doubles number of files, ***Text Imprinter*** converts text to hi-res...

UTILITY CITY™

$29.50 (Compatible with any version of Apple II/DOS 3.3)

21 UTILITIES: List-formatter puts each statement on a new line, create multi-column catalogs, invisible/trick file names, etc. For the Applesoft programmer; very educational.

Graphics

ALPHA PLOT™

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HI-RES DRAWING & TYPING (6 colors, 280x192 pixels) on both hi-res pages. Draw and manipulate all kinds of images and store on disk. Compress pix to 1/3 disk space.

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SHAPE ANIMATION: Your drawings are converted into hi-res "shape tables" so your programs can perform animation with Apple's built-in DRAW & XDRAW commands. ***List and Learn*** disk demos teach you hi-res programming.

FANCY TYPE: Six proportionally-spaced large and small fonts are on the Apple Mechanic disk, with 26 more on our ***Apple Mechanic Typefaces™*** disk (sold separately: $20.00).

BEAGLE GRAPHICS™

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DOUBLE HI-RES! 16 hi-res colors and 192 x 560 pixels (double resolution) on your Apple IIc or 128K Apple IIe.

AS AN ARTIST, you can draw, fill and label double hi-res pictures using just the keyboard, *or* your AppleMouse™, joystick, Koala Pad™ or Graphics Tablet. Easy-to-use icon-assisted ***cut & paste*** features make graphic manipulations easy. Any image section may be altered or re-located.

OR, AS A PROGRAMMER, you get 33 new commands for drawing, filling and manipulating double-res images. You can convert normal programs and pictures to double-res, save and load any image section, compress picture data to 1/3 disk space, produce double-res "slide shows" and more.

EXCELLENT REVIEWS—see Jan-85 *A-Plus* Magazine.

GOTO YOUR APPLE SOFTWARE STORE. IF THEY DON'T HAVE THE DISK YOU WANT, THEY CAN GET IT FOR YOU—FAST.
ALL BEAGLE BROS DISKS ARE SOLD UNLOCKED AND UNPROTECTED.
PRINT PICTURES ON YOUR PRINTER
14
9
15
12
1
13
11

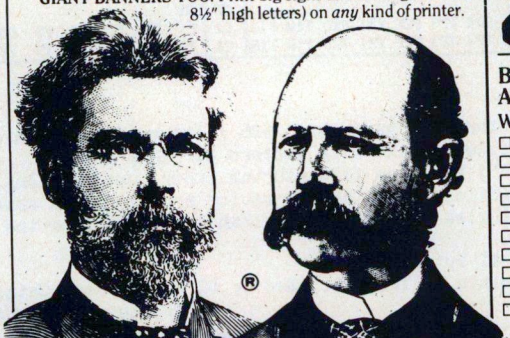
(Numbers are approximate)

TRIPLE-DUMP™

$39.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

PRINT ANY IMAGE on your dot matrix graphics-capable printer: *(1)* Hi-Res and Double Hi-Res graphics. *(2)* Lo-Res and Double Lo-Res graphics. *(3)* 40 and 80-Column text. All print routines can be used with absolutely no programming knowledge. *Or* use Triple-Dump's routines in your Applesoft programs.

GIANT BANNERS TOO: Print big signs and messages (with 8½" high letters) on *any* kind of printer.



Games

I. O. SILVER™ NEW!

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I. O. SILVER is both a thinking person's strategy game and a fast-action arcade game. Your job is to create a hi-res "Super Computer" while avoiding a pesty gang of computer bugs. Excellent high-speed animation and hi-res action.

SOURCE CODE: For interested programmers, we are offering fully-commented *I. O. Silver* Source Code on three 2-sided disks for $30. Buy the game first; info is included.

BEAGLE BAG™

$29.50 (Compatible with any version of Apple II)

12 GREAT GAMES voted by software buyers to Softalk's "Most Popular" list. The best Apple game bargain around.

```
1   POKE 50,229
10  PRINT
100 PRINT "TEST"
1000 NORMAL
10000 CALL 65338
```

And... APPLE DISK ORGANIZER

FATCAT™

$34.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

ORGANIZE YOUR DISK LIBRARY: Fatcat "reads" all of your DOS 3.3 and ProDOS disk catalogs into one or more "Master Catalog" for fast searching, sorting and printing. Update your library by simply reading new or altered disks.

ALPHABETIZE FILE NAMES in catalogs—or re-arrange in any order. *Compare* files too, and find the differences.

DISKQUIK™

$29.50 (Compatible with Apple IIc or 128K IIe/DOS 3.3)

AN EXTRA DRIVE: Make your IIc or 128K IIe think it has an extra drive connected to Slot 3. It's just like using a super-fast (hard-disk speed), silent drive. Catalog with a "CATALOG,S3" command. Save and load all kinds of files to and from RAM with normal commands (holds about *half* the data of a floppy).

MANY USES: For example, load often-used files into memory when you boot up, so they are available when you need them.

PRONTO-DOS™

$29.50 (Compatible with any version of Apple II/DOS 3.3)

TRIPLE SPEED loading and saving (hi-res pictures load in under 3 seconds!). New ***TYPE*** command displays text file contents. Move DOS for an extra 10K of usable memory.

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☐ A.Mech.Typefaces	20.00	☐ Frame-Up	29.50
☐ Beagle Bag	29.50	☐ GPLE	49.95
☐ Beagle Basic	34.95	☐ I. O. Silver	29.95
☐ Beagle Graphics	59.95	☐ ProntoDOS	29.50
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consecutively from track 0, sector 0 to track $22 (35), sector $0F. Figure 1 only shows the first eight block numbers which are those on track 0. For example, sector 0 shows (0–1), meaning Block 0—1st half; sector 1 shows (0–2), meaning Block 0—2nd half. Having these track–0 block numbers on Figure 1 is a help when translating track/sector numbers to block numbers and vice versa.

Disk Directory and File Storage Maps

Figures 2, 3, 4, and 5 show the layout of the disks and the file directory contents for DOS 3.3, CP/M, Apple Pascal, and ProDOS, respectively. In each figure, the tracks are numbered across the top. The LOGICAL sector numbers are shown down the left–hand side. Figure 2 illustrates how DOS 3.3 stores files, while Figures 3, 4, and 5 show block numbers for CP/M, Pascal and ProDOS.

The location of operating system code is shown as "system" for DOS 3.3 and CP/M and as "Load" for Pascal and ProDOS. DOS 3.3 requires three tracks (0, 1 and 2) for the DOS 3.3 system; it is possible to eliminate the "system" (VisiCalc /SI does this) so that Tracks 1 and 2 can be freed up for extra data storage (Track 0 can't be used, however). CP/M also uses tracks 0, 1 and 2 for the system. CP/M disks can be initialized without the "system," which should give 12K more disk space. However, with the original Microsoft Softcard CP/M 2.20 there appears to be no way to use that space for files because the CP/M block allocation doesn't recognize the free space. This "bug" has been eliminated in Microsoft CP/M 2.23, the current version.

In contrast to the fixed "system" tracks for DOS 3.3 and CP/M, Pascal and ProDOS use the first four sectors on Track 0 for "Load" code that is loaded when the disk is booted. The "system" code is stored as a file just like any other file. Disks with this system file will boot; those without the file are "data" disks that will not boot.

Also shown in Figures 2, 3, 4 and 5 is the space allotted for the catalog (directory) of file storage, and the information contained therein is expanded at the bottom of each figure. The words "catalog" and "directory" mean the same thing and designate the information which tells where a file is stored. "Catalog" is used with DOS 3.3 and "directory" is used with CP/M, Pascal, and ProDOS (but ProDOS still hangs on to the DOS 3.3 CATALOG command for sentimental reasons).

DOS 3.3 Road Map

The contents of a DOS 3.3 disk are described in Appendix C of Apple's *The DOS Manual* for DOS 3.3. In the following discussion, I'll describe just what is necessary to locate a file on the disk, and then discuss how files are stored and some of the problems in converting DOS 3.3 files to ProDOS.

As shown in Figure 2, Track $11, sector 0 of a DOS 3.3 disk contains the VTOC (Volume Table Of Contents), which is of little use to someone just trying to find a file on the disk. The remainder of track $11 is allotted for CATALOG sectors on which file directory information is recorded. "C1," at sector $0F, is the first catalog sector, and the remaining (C2–C15) are stored in reverse order. Each catalog sector contains an initial header of 11 bytes, of which the second and third bytes contain the track and sector of the next catalog sector. Since DOS 3.3 always numbers these bytes in the same order, there is no need to look at these bytes since you already know the order in which the catalog sectors are stored (Figure 2). To start reading the catalogs, just go directly to Track $11, sector $F, then move backward to preceeding sectors $0E, $0D, etc.

A typical DOS 3.3 catalog entry is shown at the bottom of Figure 2. The entry is 35 bytes long. The first two bytes ($12 & $0F in Figure 2) indicate the location of the Track/Sector list for the file. (The contents of

FIGURE 2

APPLE II DOS 3.3 DISK MAP

TRACK

SEC	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22
0		DOS																VTOC																
1																		C15																
D 2																		C14																
O 3		3.3																C13																
S 4																		C12																
5																		C11																
6		SYSTEM																C10																
S 7																		C9																
E 8																		C8																
C 9																		C7																
T A																		C6																
O B																		C5																
R C																		C4	F32															
D																		C3	T32															
E			F31	F30	F29	F28	F27	F26	F25	F24	F23	F22	F21	F20	F19	F18		C2	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17
F			T31	T30	T29	T28	T27	T26	T25	T24	T23	T22	T21	T20	T19	T18		C1	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17

```
VTOC = Volume Table Of Contents.
C1-C15 = Catalog sectors, 7 files/sector = 15 sectors =  105 files maximum per disk.
T1-T32 = Track/Sector List for each file.   (122 file sectors per T/SL sector).
F1-F32 = First sector of each file. (F1-F32 show file storing order, used as long as space is free).
                                    (Files longer than 1 sector are stored on same track at sectors E to 0).
                                    (Files that fill more than 1 track follow the T1 - T32 order seeking free sectors).
DOS 3.3 Catalog Sector
Header in each Catalog Sector, first 11 bytes.
00110E0000000000000000    :    110E points to Track 11, Sector 0E as the next Catalog Sector.
File entry, 35 bytes/file:                                          !!= Last name byte set = 1st catalog byte (T of T/SL)
120F02C8C5CCCCCFA0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A00200                when file is deleted.
!- -!-!H E L L O - - - - - - - - - - - - - - - - - - - - - - - !!- -
^   ^ ^-------------File Name, 30 Characters, maximum ----------^^
!   !-File Type:                                                    !-  File Length, LO/HI byte.
T/S     00= Text File                                               0200 = 0002 = 2 sectors.
List    01= Integer BASIC file
T=12    02= Applesoft file
S=0F    04= Binary file
        08= S type file       =    = (Apple has not defined these types of files for DOS 3.3)
T=00    10= Relocatable file  =
 if     20= A type file.      =
Deleted 40= B type file.      =
       +80= File is locked.
```

the Track/Sector list are discussed below). The third byte identifies the type of file. The next 30 bytes hold the file name. The last two bytes contain the length of the file in disk sectors. Each catalog sector can store up to seven of these 35-byte catalog entries (11-byte header + 35*7 = 256 bytes).

Moving on from the catalog sector to files themselves, in Figure 2 at Track $12, Sector $F, "T1" is written. T1 indicates the location of the Track/Sector List (T/SL) for File 1. The T/SL lists all the sectors used for a file. The first file stored on an initialized disk (usually the HELLO file) is always stored on Track $12, and the first sector of file data is stored at Track $12, Sector $E, as indicated by "F1" in Figure 2. The T/SL reflects this, as you can see below in the first few lines of a Zap program reading of the T/SL:

```
00 0000000000000000000000000
0C 120E000000000000000000000
18 000. . . ..
.. . . . .
```

The only non-zero bytes for this file are "12" and "0E", indicating the location of the single sector of file F1. If File 1 is longer than one sector *and is saved all at the same time*, the sectors are placed on Track $12 in reverse order: $0E, $0D, $0C, $0B, . . . 2, 1, 0. If more than 15 sectors are required, the track is increased to $13 and file sectors are stored on disk sectors F to 0 in order. Note that this storing order only occurs during one single SAVE or WRITE operation. If a file, previously stored all on track $12, is modified such that it increases in size, the new sectors will be placed on a new track.

Reading the T/SL will tell you where all the sectors of a file are located. A Zap program can then be used to read the sectors of the file in the order given by the T/SL.

Figure 2 shows how DOS 3.3 would store 32 files, each only one sector long. Files F1 to F17 are stored moving out on the disk from track $12 to track $22. File F18 is stored on Track $10 and subsequent files are stored on decreasing track numbers until Track $3 is reached, after which the storing order returns to Track $12 to repeat the cycle. It may be unrealistic to use an illustration of 32 files, each only one sector long. However, this is exactly what happens when random access files are stored by DOS 3.3, one record at a time with OPEN...CLOSE operations between records. DOS 3.3 stores each new sector of the random file on a new track as if it were a new file. The same is true of sequential files which are generated by repeated APPEND operations. The result of this storage sequence which strings files out across tracks is that file access is slowed down by the time required to move the disk head to a new track for each sector.

Writing and reading of DOS 3.3 text files can be speeded up considerably by pre-

Robinson Crusoe would have loved La Triviata

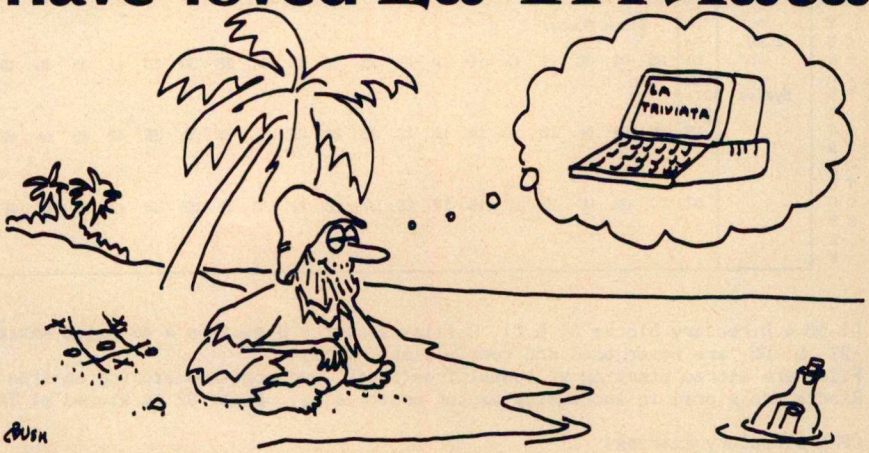

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FIGURE 3

APPLE II CP/M 2.20 DISK MAP

TRACK

SECTOR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22
0	CP/M			D1	04	08	0C	10	14	18	1C	20	24	28	2C	30	34	38	3C	40	44	48	4C	50	54	58	5C	60	64	68	6C	70	74	78	7C
1				D2																															
2				D3	Block Number																														
C 3	2.20			D4																															
P 4				D5	05	09	0D	11	15	19	1D	21	25	29	2D	31	35	39	3D	41	45	49	4D	51	55	59	5D	61	65	69	6D	71	75	79	7D
/ 5				D6																															
M 6	System			-D7-																															
7				-D8-																															
S 8				02	06	0A	0E	12	16	1A	1E	22	26	2A	2E	32	36	3A	3E	42	46	4A	4E	52	56	5A	5E	62	66	6A	6E	72	76	7A	7E
E 9																																			
C A																																			
T B																																			
O C				03	07	0B	0F	13	17	1B	1F	23	27	2B	2F	33	37	3B	3F	43	47	4B	4F	53	57	5B	5F	63	67	6B	6F	73	77	7B	7F
R D																																			
E																																			
F																																			

D1-D6 = Directory blocks 00 & 01, 8 files/sector * 6 sectors = 48 files maximum per disk.
-D7- & -D8- are never used and remain blank ($E5).
Files are stored starting at lowest free block, and continue storing on free blocks in increasing block order.
Blocks are stored in increasing sector order, e. g., Block 02 is stored at Track 3, Sector 8, then 9, then A, then B.

```
CP/M Directory Entries:
No header.
File entry, 32 bytes/file:
00504950202020202043 4F4D0000003A020304050607080900000000000000000
!-!P I P - - - - -!C O M!-!- -!-!- - - - - - - - - - - - - - - -!
^ ^F i l e n a m e.E x t ^    ^ ^-- Block Allocation ----------^
!                        !    ^-- Number of Records in file.
^---User Number          !        Record = 128 bytes (2 Records/sector).
    (E5 if file          !        Block  = 8 records = 4 sectors = 1024 bytes.
     is deleted)         ^- Extent number, 16 blocks per extent, = 1 directory entry.
```

initializing the file, opening the file once, writing blank strings that fill all the records on a single track, and then closing the file. When that track fills up, a new one can be pre-initialized. (WARNING—it may occur to you that an easier way to pre-initialize a file is simply to go into the Track/Sector List with your Zap program and write in the track/sectors that you want saved for the file. That will work only if you also update the VTOC to mark the sectors as in use. If you don't do that, your file can be wiped out by DOS 3.3!)

Pre-initializing random files to be blank-filled ($A0) has a further advantage if you want to convert DOS 3.3 files to ProDOS using the DOS 3.3-to-ProDOS CONVERT program. The DOS 3.3 INIT operation initializes a disk entirely with $00 bytes. A $00 is sensed both by DOS 3.3 and by ProDOS as an END OF FILE condition. If a random DOS 3.3 file contains any records for which the data does not entirely fill the record, the trailing $00 bytes in that record will trip the END OF FILE error in the ProDOS CONVERT program and conversion will cease at that record (which may be the first record). Eliminating all the $00 bytes in a random DOS 3.3 file will allow ProDOS CONVERT to convert the entire file. An existing DOS 3.3 random file which contains $00 bytes can be "fixed" for conversion by reading in each record using DOS 3.3, adding a pad of blanks to fill out the entire record, and then writing the padded record to a new file which can then be CONVERTed. A really "brute force" method of fixing a random file for conversion is to use a Zap program to hand-edit all the $00 bytes in the file to $A0. I did this the first time I encountered the ProDOS CONVERT program but quickly sought less time-consuming methods. Other more elegant ways of CONVERTing are no doubt forthcoming, but these brute force methods are sure to work in a pinch and are easy to understand.

To summarize, the steps for finding a file on a DOS 3.3 disk are:

1. Read catalog sectors C1–C15 at Track $11, starting at sector $F and moving to preceding sectors toward 1, until you find the desired file name. If your Zap program is not set for DOS 3.3 sector order, use Figure 1 to translate DOS 3.3 logical catalog sector numbers to the appropriate sectors (or blocks) for your Zap program.
2. Once you find the file name, count 3 bytes to the left of the first letter in the file name to get the Track and Sector of the Track/Sector List (T/SL) for the file.
3. Read the T/SL sector and note the list of tracks and sectors for the file. Use Figure 1 to translate sectors as necessary for your Zap program.
4. Read the file in track/sector order according to the T/SL.

Apple CP/M 2.20 Road Map

Figure 3 shows the Track/Sector map for Apple CP/M 2.20 disks. Note that, like DOS 3.3, the CP/M system binary code is contained on Tracks 0–2. Unlike DOS 3.3, the directory of CP/M files is on Track 3, Sectors 0–7, shown as "D1–D8" in Figure 3. (D7 and D8 are not used, as discussed below.) For tracks 3 to $22, the disk map shows the numbers 02...7F within the track/sector map space. These numbers are CP/M "blocks." CP/M stores files in blocks of 1024 bytes. Since Apple disks are designed with 256-byte sectors, CP/M uses four sectors together as one "block." CP/M Blocks 00 and 01 are reserved for the disk directory; data can be stored in blocks 02 to $7F. File storage space, therefore, is 126 blocks of 1024 bytes each, or 129,024 bytes on each disk. Running the CP/M STAT program on a new disk will indicate 126K free bytes, but the "126" really means free blocks.

With CP/M we don't have to worry about separate track/sector lists because the "track/sector list" is contained within the file catalog directory itself, not directly as tracks and sectors, but as CP/M blocks allocated to the files.

Figure 3 shows the CP/M directory entry for a typical file, PIP.COM, the CP/M equivalent of the DOS FID file copying program. The directory entry for each file is 32 bytes long. There is no header—as with DOS 3.3—preceding the file entries because the CP/M directory is always at the same place, blocks 00 and 01. Thus, no information is needed regarding the location of the "next" catalog sector, as in DOS 3.3.

The first byte of each file directory section (00 in Figure 3) is the "CP/M User Number"—useless for a personal computer, but when a file is deleted, this first byte is set to $E5 to denote the deleted status. Zap programs can be used to un-delete a CP/M file by simply resetting the first directory entry to 00.

The next 11 bytes after the user number are the file name (8 characters) and the 3-letter extension, sometimes called the file type. Note that there is no space for the "." between the name and the extension; the "." is automatically taken care of by the CP/M system when needed, as when you see PIP.COM displayed on the screen.

Following the filename.ext entry, one byte specifies the "extent" of the directory entry. Don't confuse the "extent" with the file name "extension". "Extension" refers to the three-letter addition to the file name; "extent" relates to the size of the file itself, as described below. Following the file extent there are two unused bytes (or of unknown use by CP/M), then there is one byte that specifies the "number of records" in the file, and, following that, 16 bytes that specify the "block allocation".

Block allocation is a block list similar to the DOS 3.3 Track/Sector List; the blocks used to store the file are listed in storage order. In Figure 3, the block allocation for PIP.COM is:

02 03 04 05 06 07 08 09 00 00 00 00 00 00 00 00.

This shows that PIP.COM is stored in eight CP/M blocks, 02 to 09. Since one block consists of four DOS 3.3 sectors, the disk space allocated is 8 x 4 = 32 sectors long (8192 bytes).

The block allocation has space for a list of 16 blocks (16384 bytes). What happens if the file is longer than 16 blocks? When the 16th block is filled, CP/M creates an entirely new directory entry with the same file name, but places 01 in the extent field. The block allocation section then is filled with the block numbers on which the 17th to the 32nd data blocks are stored. This incremental extent procedure is continued to the end of the file.

Between the "extent" and the "block allocation" directory entries, Figure 3 shows a one-byte "number of records" entry of $3A. Each CP/M 1024-byte block is divided into 8 records of 128 bytes each. Standard CP/M reads and writes each file block in 128-byte records, compared with the Apple II disk which reads and writes data in 256-byte sectors. For the PIP.COM file example shown in Figure 3, there are 8 blocks allocated, times 8 records per block, or 64 possible 128-byte records. Decimal 64 is $40 hexadecimal. However, Figure 3 shows $3A (58 decimal) in the "number of records" byte in the directory for PIP.COM. Therefore PIP.COM actually occupies only 58 of the 64 records allocated; at 2 records per sector, PIP.COM occupies 29 of the allotted 32 sectors—3 sectors are empty. With the 4-sector block size, CP/M can waste a lot of space, particularly with many small files.

The CP/M directory has the capacity for 64 files (or extents of files) at 16 blocks each, or a total of 1024 blocks (4096 Apple disk sectors). But the Apple CP/M disk has only 126 blocks (504 sectors) available. This is the price paid in stuffing CP/M, intended for 8-inch disks, onto the 5¼" Apple disks.

While space for 64 files is available in the directory, Microsoft CP/M for the Apple II (and perhaps others) allows a maximum of 48 files in the directory, using only 6 of the 8 directory sectors. My guess is that the constraint of the Apple 40 column screen limited the number of files that could be listed with the DIR command for a disk catalog. The result is two totally wasted sectors on an Apple CP/M disk.

As shown in Figure 3, files can only be stored in blocks 02-$7F (tracks 03 to $22); space on tracks 00 to 02 are reserved for the CP/M system; disks which actually have the CP/M system written on these tracks are called "system" disks. It is possible to create disks with no CP/M system on tracks 00-02; these disks are called "data" disks as opposed to "system" disks. CP/M 2.20 by

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Microsoft has no way to access tracks 00–02 on a "data" disk for data storage. An update by Microsoft, CP/M 2.23, corrects this deficiency. Disks created with the new CP/M 2.23 command COPY B:/D option are true "data" disks on which files can be stored on tracks 00–02. This extra file storage starts at Track 00, sector 00–03, as CP/M block $80, and progresses to track 02, sector $0C–$0F as CP/M block $8B.

The CP/M STAT command executed for a disk on which PIP.COM is located shows the following for PIP.COM:

Recs	Bytes	Ext	Acc	
58	8k	1	R/W	B:PIP.COM

"Recs" (58) is the number of records in the file (29 sectors). "Bytes" (8k) is actually the number of blocks allocated for the file, indicating 8 blocks. "Ext" is the count of the number of 16–block directory entries allocated to the file; PIP.COM requires less than 16 blocks, so STAT shows "Ext" as 1.

CP/M stores files on blocks in ascending order, starting at the first free block. When an occupied block is encountered, CP/M skips to the next higher free block to continue storing. Modified files can become strung out all over the disk, much in the same way as with DOS 3.3 (but unlike Pascal, which keeps one file together on contiguous sectors).

Summarizing, the steps for finding a file on an Apple II CP/M 2.20 disk are:

1. Read the directory sectors D1–D6 at Track 3, starting at CP/M logical sector 0 and moving toward sector 5, until you find the desired file name. If your Zap program is not set for CP/M sector order, use Figure 1 to translate CP/M logical sector numbers to the appropriate sectors (or blocks) for your Zap program.
2. Once you find the file name, count 15 bytes to the right of the first letter of the file name to get the block number of the first block of the file. Use Figures 3 and 1 as necessary to identify the Track and Sector where the file starts.
3. Read the rest of the directory entry to get the remaining file blocks. If all 16 block allocation bytes are filled, check the number–of–records field to see if it is $80, indicating that the entire 16 blocks (128 records) are filled; and if so, check the other directory entries for the rest of the file (the other "extents"). Translate the block numbers for the file, using Figures 3 and 1, into the Tracks and Sectors for your Zap program.
4. Read the file in the appropriate Track/Sector order according to the translated list of blocks.

Apple Pascal Road Map

Figure 4 shows the Track/Sector map for Apple Pascal disks. Track 0, Sectors 0 to 3, contain binary code which is used for initial booting, shown as "Load" in Figure 4. The file directory is on Track 0, Sectors 4 to $0B. The disk map shows the numbers 06...117 within the track/sector map space. These numbers are Pascal "blocks." Pascal stores files in blocks of 512 bytes. Since Apple disks are designed with 256–byte sectors, Pascal uses two sectors together as one "block." Pascal blocks 00 and 01 are reserved for the Load code; blocks 02 to 05 are reserved for the disk directory; data can be stored in blocks 06 to

FIGURE 4

APPLE II PASCAL DISK MAP

TRACK

PHYS SECT	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22
0	L 00	08	10	18	20	28	30	38	40	48	50	58	60	68	70	78	80	88	90	98	A0	A8	B0	B8	C0	C8	D0	D8	E0	E8	F0	F8	100	108	110
P 1	O	BLOCK NUMBERS																																	
A 2	A 01	09	11	19	21	29	31	39	41	49	51	59	61	69	71	79	81	89	91	99	A1	A9	B1	B9	C1	C9	D1	D9	E1	E9	F1	F9	101	109	111
S 3	D																																		
C 4	D D1	0A	12	1A	22	2A	32	3A	42	4A	52	5A	62	6A	72	7A	82	8A	92	9A	A2	AA	B2	BA	C2	CA	D2	DA	E2	EA	F2	FA	102	10A	112
A 5	I D2																																		
L 6	R D3	0B	13	1B	23	2B	33	3B	43	4B	53	5B	63	6B	73	7B	83	8B	93	9B	A3	AB	B3	BB	C3	CB	D3	DB	E3	EB	F3	FB	103	10B	113
7	E D4																																		
S 8	C D5	0C	14	1C	24	2C	34	3C	44	4C	54	5C	64	6C	74	7C	84	8C	94	9C	A4	AC	B4	BC	C4	CC	D4	DC	E4	EC	F4	FC	104	10C	114
E 9	T D6																																		
C A	R D7	0D	15	1D	25	2D	35	3D	45	4D	55	5D	65	6D	75	7D	85	8D	95	9D	A5	AD	B5	BD	C5	CD	D5	DD	E5	ED	F5	FD	105	10D	115
T B	Y D8																																		
O C	06	0E	16	1E	26	2E	36	3E	46	4E	56	5E	66	6E	76	7E	86	8E	96	9E	A6	AE	B6	BE	C6	CE	D6	DE	E6	EE	F6	FE	106	10E	116
R D																																			
E	07	0F	17	1F	27	2F	37	3F	47	4F	57	5F	67	6F	77	7F	87	8F	97	9F	A7	AF	B7	BF	C7	CF	D7	DF	E7	EF	F7	FF	107	10F	117
F																																			

```
D1-D6 = Directory blocks 02-05, 9 files/sector * 8 sectors = 71 files maximum per disk + 1 Volume Entry.
Files are stored starting at end of last active file and continue on increasing blocks.
Deleted files leave holes that are used for files small enough to fit in the empty space.  Holes can be filled by K)runch.

Volume Entry, one per disk, 26 bytes, starting at Block 02, byte 00.
000006000000064150504C4531001B010A00000087A600000000
!- -!- -!- -!-!A P P L E 1 -!- -!- -!- -!- -!- -!- -
^   ^   ^   ^ ^-Volume ----^^   ^          ^-Date, packed record = $A687
!   !   !   !   Name        !   !-No. of files.                  $ A   6   8   7
!   !   !   !               !-No. Blocks on Disk (280)            1010 0110 1000 0111
!   !   !   ^---No. of letters in Volume Name.                       ///
!   !   ^-- Dummy, not used.                                      1010011  01000 0111
!   ^-- Block for start of first file.                            Year     Day   Month
^-- Block for start of file.                                     $ 5  3     08    7  = 83/8/7 = July 8, 1983

File Entry, 26 bytes/file, following Volume Entry.
060026000500C53595354454D2E4150504C4500766700021BA2
!- -!- -!- -!-!S Y S T E M . A P P L E - - -!- -!- -
26004100020000D53595354454D2E504153434147667000269A1
!- -!- -!- -!-!S Y S T E M . P A S C A L - -!- -!- -
^   ^   ^   ^ ^---- File name ------------^^   ^-Date, packed record.
!   !   !   !                                 !- Bytes in last block.
!   !   !   ^---No. of letters in File Name, 00 if deleted.
!   !   ^-- File type ------------------------>0200 =  Code file
!   ^-- Block for start of next file (LO/HI).   0300 =  Text file
^-- Block for start of file (LO/HI).            0500 =  Data file
```

$117. File storage space, therefore, is 274 blocks of 512 bytes each, or 140,288 bytes on each disk. Running the Pascal FILER program (D directory option) on a new disk will indicate 274 free blocks.

With Pascal we don't have to worry about separate track/sector lists because the "track/sector list" is contained within the file catalog directory itself—not directly as tracks and sectors, but as Pascal blocks allocated to the files.

Figure 4 shows, just beneath the track/sector–block map, a "Volume Entry". Each Pascal disk has one volume entry, similar to the DOS 3.3 header, at the beginning of the directory—block 02 (track 0, sector 4). The volume entry is 26 bytes long. The first 2 bytes are always 0000. The next 2 bytes are 0600, indicating the block at which the first file starts. The number 0600 is written in low byte/high byte order so that 0006 is the normal way of writing this number. 0006 means that the first file starts at block 06, just after the end of the directory. The next 2 bytes are always 0000. Thus, the first six bytes are always 000006000000.

Following the first 6 bytes is a one–byte number specifying the length of the volume name, 06 in Figure 4 for APPLE1 shown as the volume entry example. This number is then followed by 7 bytes containing the volume name. After the volume name is a 2–byte entry, 1801, in low byte/high byte order, specifying the number of blocks on the disk. $0118 is decimal 280, 280 blocks on an Apple Pascal disk (2 times 280 is 560 sectors). After the number–of–blocks entry is a two–byte low/high value, 0A00 in Figure 4, which specifies the number of files on the disk—$000A or 10 files. Following the number–of–files entry are two bytes that are unused, or of unknown use.

The next four bytes in the volume entry are the date when the volume was created, 87A6 in Figure 4. Pascal stores dates in a "packed record" format which has to be separated bit by bit to obtain the normally recognized information. The date record is created in Pascal by the following declaration:

```
TYPE DATE =      PACKED RECORD

Month:    1-12;    (* requires 4 bits *)
Day:      1-31;    (* requires 5 bits *)
Year:     1-99;    (* requires 7 bits *)
END;               (* total 16 bits *)
```

The date entry in Figure 4 of 87A6 is $A687. Breaking this down bit by bit gives:

```
A        6        8        7
1010     0110     1000     0111

7 bits          5 bits   4 bits
1010011         01000    0111
Year            Day      Month;
5 3             8        7 =

$53/8/7 = 83/8/7
        = July 8, 1983
```

Following the date bytes are four bytes that are unused, 00000000 in Figure 4.

Figure 4 shows the directory entries for two typical files, SYSTEM.APPLE and SYSTEM.PASCAL. The directory entry for each file is 26 bytes long. The first two bytes of the directory entry are the block at which the file starts (low/high form), followed by two bytes specifying the block where the next file starts. In Figure 4, the directory entry for SYSTEM.APPLE shows that it starts at 0600 ($0006, Block 6) and the next file starts at 2600 ($0026, Block 26). The directory entry for the next file, SYSTEM.PASCAL, shows it starts at 2600 ($0026, Block 26) and the file which follows SYSTEM.PASCAL starts at 4100 ($0041, Block 41). Following the block start/next–file entries is a two byte number specifying the file type (Code, Text or Data). This is followed by a one–byte entry specifying the length of the file name, 15 characters maximum. Next is the file name itself. After the file name comes a two–byte entry which is a count of the number of bytes in the last block of the file. Finally, the last entry for the file is the date the file was created in the same packed record format as for the volume date.

Note that the file block locations only specify the block where the file starts and the block for the start of the next file. There is no block allocation list as in CP/M nor any Track/Sector List as in DOS 3.3. Pascal stores each file in one continuous chunk, and new files are added at the end of the last file on the disk. When files are deleted, the space is marked as unused by writting $00 in the byte for the number of characters in the file name (seventh byte in the file directory entry). This unused space can only be recovered by executing the K)runch function in the Pascal Filer program, to move all files forward over the unused space.

Pascal text files created by the E)dit operation have the entire first two blocks (four sectors) devoted to storing some information required by the editor. The actual file does not start until the third block (fifth sector). When looking for a Pascal text file, these initial four sectors are mostly filled with $00, so it is easy to become confused about the starting block designation.

Summarizing, the steps to find an Apple II Pascal file are:

1. Read the directory sectors D1–D8 at Track 0, starting at Pascal logical sector 4 and moving toward sector $B, until you find the desired file name. If your Zap program is not set for Pascal sector order, use Figure 1 to translate Pascal logical sector numbers to the appropriate sectors (or blocks) for your Zap program.
2. Once you find the file name, count 7 bytes to the left of the name and

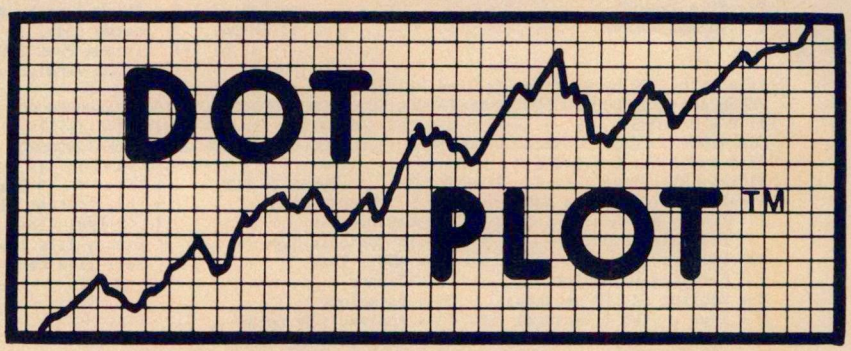
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FIGURE 5

APPLE ProDOS DISK MAP

```
                                        TRACK
        0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22
      +-----------------------------------------------------------------------------------------------------------+
    0 | L 00 08 10 18 20 28 30 38 40 48 50 58 60 68 70 78 80 88 90 98 A0 A8 B0 B8 C0 C8 D0 D8 E0 E8 F0 F8 100 108 110
P   1 | O      BLOCK NUMBERS                                                                                      |
r   2 | A 01 09 11 19 21 29 31 39 41 49 51 59 61 69 71 79 81 89 91 99 A1 A9 B1 B9 C1 C9 D1 D9 E1 E9 F1 F9 101 109 111
o   3 | D                                                                                                         |
D   4 | D D1 0A 12 1A 22 2A 32 3A 42 4A 52 5A 62 6A 72 7A 82 8A 92 9A A2 AA B2 BA C2 CA D2 DA E2 EA F2 FA 102 10A 112
O   5 | I D2                                                                                                      |
S   6 | R D3 0B 13 1B 23 2B 33 3B 43 4B 53 5B 63 6B 73 7B 83 8B 93 9B A3 AB B3 BB C3 CB D3 DB E3 EB F3 FB 103 10B 113
    7 | E D4                                                                                                      |
S   8 | C D5 0C 14 1C 24 2C 34 3C 44 4C 54 5C 64 6C 74 7C 84 8C 94 9C A4 AC B4 BC C4 CC D4 DC E4 EC F4 FC 104 10C 114
E   9 | T D6                                                                                                      |
C   A | R D7 0D 15 1D 25 2D 35 3D 45 4D 55 5D 65 6D 75 7D 85 8D 95 9D A5 AD B5 BD C5 CD D5 DD E5 ED F5 FD 105 10D 115
T   B | Y D8                                                                                                      |
O   C | bit 0E 16 1E 26 2E 36 3E 46 4E 56 5E 66 6E 76 7E 86 8E 96 9E A6 AE B6 BE C6 CE D6 DE E6 EE F6 FE 106 10E 116
R   D | map                                                                                                       |
    E |   07 0F 17 1F 27 2F 37 3F 47 4F 57 5F 67 6F 77 7F 87 8F 97 9F A7 AF B7 BF C7 CF D7 DF E7 EF F7 FF 107 10F 117
    F |                                                                                                           |
      +-----------------------------------------------------------------------------------------------------------+

D1-D8 = Directory blocks 02-05, 13 entries/block = 4 blocks = 1 Volume Entry + 51 files.
bit map = map of blocks used,  1 bit/block, 0 = used, 1 = free.
Files stored beginning at block 07, new files added at any lowest free block.
File store order is: Seedling data block - Index Block 1 - 255 data blocks - Master Index block - Index Block 2 - 256 data blocks ++
Key Block is: 1. Seedling - First data block (no other blocks used).  Max file size: 1 data block.
              2. Sapling  - Index Block No. 1 (lists Seedling block + up to 255 Sapling data blocks). Max file size:   256 data blocks.
              3. Tree     - Master Index Block (lists Index Block 1 + up to  127 more index blocks).  Max file size: 32768 data blocks.

PrevNext = Previous/Next blocks of the Directory, 4 bytes at start of every directory block.
!- -!- -Volume Entry, one per disk, 39 bytes, starting at Block 02, byte 04.
00000300FB50524F444F532E312E3044000000000000000000000000000000000000000000C3270D100006001801
        !! P R O D O S . 1 . 0 D - - - -!- - - - - - - -!- -!- -!-!-!-!-!-!- -!- -!- -
        !!^-Volume Name ---------------^^- Reserved ----^   ^   ^ ^ ^ ^ ^ ^   ^   ^-No. of Blocks, LO/HI, $0118 = 280
        !!                                                 !   Time! ! ! ! ! !   ^- Bit map block, LO/HI, $0006 = Block 06
        !^--No. of letters in Volume Name, 15 maximum.    ^Date   ! ! ! ! ! ^- No. of files, LO/HI, $0010 = 10
        !                                                  Created ! ! ! ! ^- Entries per block, ($0D = 13)
        ^-- File Type:                                    (packed, ! ! ! ^-Entry length, $27 = 39 bytes.
        F = Volume Header                                  YY-MM-DD! ! ^- Access code.
                                                           7- 4- 5! ^-!- Minimum ProDOS Version = 00
                                                           bits)  ^-!-!- ProDOS Version = 00
        File Entry, 39 bytes/file, follows Volume Entry !   !   ! ! !
        2650524F444F5300000000000000000000FF08001F00003C000000000000002100202 1A800000200
        !! P R O D O S - - - - - - - - -!-!- -!- -!- - -^- -^- -^-^-^-!- -!- -!- -!- -
        2C4241534 9432E53595354454D000000FF27001500002800000000000000210020 6FA700000200
        !! B A S I C . S Y S T E M - - -!-!- -!- -!- - -^- -^- -^-^-^-!- -!- -!- -!- -
        !!^---- File name -------------^! !   !   ^-Bytes to EOF       !   !   !   ^-Header Pointer
        !^--No. letters, File Name,     ! !   ^-Blocks used            !   !   ^-Last Close Time, Mn/Hr
        !       15 maximum.             ! ^-Key Block                  !   ^-Last Close Date (Packed- Year-Month-Day, Bits 7-4-5)
        ^-- File Size Type:             ^-File Contents Type:          ^-Binary file load address, or
        00= Deleted                     04 = ASCII Text                ^-Text file record length.
        1 = Seedling (1 sector)         06 = Binary
        2 = Sapling (2-512 sectors)     0F = Directory
        3 = Tree    (>512 sectors)      FC = Applesoft Program
        D = Subdirectory                FD = Applesoft Variables
        E = Subdir. header              FE = Relocatable
        F = Volume Header               FF = ProDOS System
```

note the two-byte number of the starting block for the file. Don't forget to reverse the low/high byte order when decoding this number. Use Figures 4 and 1 as necessary to identify the Track and Sector where the file starts.

3. Note the two-byte number to the right of the starting block number; this is the starting block of the next file. Subtract one to determine the ending block of the file of interest. If you are using a "non-Pascal" sectored Zap program, you must decode the block numbers into the Track and Sector numbers for each sector of the file, using Figures 4 and 1.

4. Read the file in the appropriate Track/Sector order according to the translated list of blocks, remembering that text files have a four-sector header that contains some information used by the text editor.

Apple ProDOS 1.0 Road Map

Apple ProDOS disk structure is a hybrid of DOS 3.3 and Apple Pascal. From Pascal comes the basic layout of the disk using the same physical-logical sector order and two-sector blocks of 512 bytes, a two-block load section, a four block directory, and files stored in block order. From DOS 3.3 comes the concepts of sector use bit maps and track/sector lists which allow parts of files to be stored anywhere on the disk (no more Pascal K)runching). From the standpoint of combined speed of disk access and efficient use of space, ProDOS surpasses its predecessors.

Figure 5 shows the Track/Sector map for Apple ProDOS disks. Note the similarity to the Pascal map in Figure 4. Track 0, Sectors 0 to 3, contain binary code which is used for initial booting, shown as "Load" in Figure 5. The file directory is on Track 0, Sectors 4 to $0B. The disk map shows the numbers 07...117 within the track/sector map space. These numbers are ProDOS "blocks". ProDOS stores files in blocks of 512 bytes, using two Apple disk sectors as one block. ProDOS blocks 00 to 06 are reserved for the load code, the disk direc-

tory, and a bit map; data can be stored on blocks 07 to $117. Therefore, file storage space is 273 blocks of 512 bytes each, or 139,776 bytes on each disk.

"Bit map" is indicated on Figure 5 at track 0, sectors C and D (block 6). This bit map does not exist on Pascal disks (Figure 4). Like the DOS 3.3 VTOC, the ProDOS bit map maintains a record of the blocks on the disk that are currently in use by active files. You normally don't need to concern yourself with the bit map when just searching a disk for files. But altering file space or recovering damaged or deleted files requires changing the bit map. The ProDOS bit map is much simpler than the DOS 3.3 VTOC; starting with the first byte, bits are set to 1 for free blocks, and to 0 for blocks in use. Since Apple floppies have eight ProDOS blocks per disk track, each 8-bit byte corresponds to one disk track. Therefore, the bit map for a newly formatted disk will show "01 FF FF FF . . . FF." The 01 shows that the first 7 blocks (on track 0) are in use for the Load Code (2 blocks), the Directory (4 blocks), and the bit map (1 block). The last block, $07, is not used (free), and all the remaining blocks on the disk are unused.

With ProDOS we have to pay attention to "Track/Sector Lists" like DOS 3.3, but the lists are called "index blocks." Files that can be stored in only one block (2 sectors) are called "Seedling" files and have no index block. If the file requires more than one block, an index block is created which is similar to the DOS 3.3 Track/Sector List, but lists the ProDOS block numbers instead of tracks and sectors. Files with one index block are called "Sapling" files. Up to 256 block numbers can be stored in one index block, providing a maximum Sapling file size of 128K bytes (512 sectors). If the file requires more than one index block, a new Master Index Block is created which is an "index of the index blocks"—like a "Track/Sector List" of Track/Sector Lists. Files with a Master Index Block are called "Tree" files and can address a file of up to 16 megabytes. Files that big would require a hard disk (and a lot of hard work to fill them up). The largest Tree file that can be stored on an Apple floppy disk is 270 blocks (540 sectors). A formatted ProDOS disk has 273 blocks free, but a Tree file uses 3 blocks for index blocks: one for the Sapling (first) index block, one for the Master Index Block, and one for the second index block.

Figure 5 shows, just beneath the track/sector map, a brief listing of the way that files are stored on ProDOS disks. The Seedling-Sapling-Tree progressive binary tree structure requires that one block be identified as the first block that needs to be examined to start the process of finding a file. This block is called the "Key Block." As a file grows the key block changes, and Figure 5 provides a note in the lines below the track/sector map that defines which is the key block for the three basic arbor-like ProDOS files.

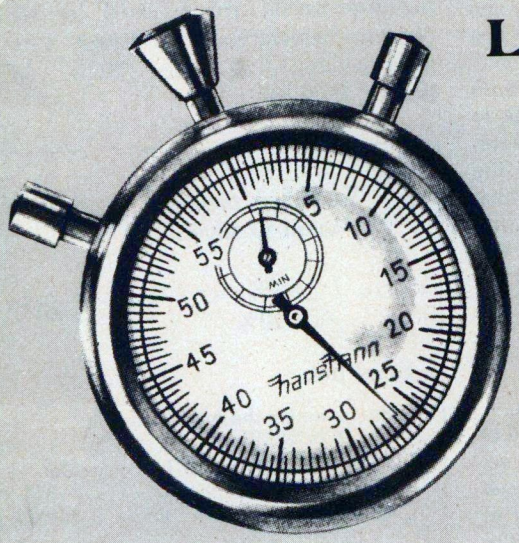
Block numbers are stored in the index blocks in an unusual manner. If you look at an index block with a Zap program, you may see a list like this:

```
07 09 0A 0B 0C . . .
```

These indicate the file is stored in blocks 7, 9, $0A, $0B, etc. What may not be immediately apparent is that only one byte is being used for each block number. This is not a problem up to block $FF. But what do we do with block $100, which should be stored as 00 01 in the low/high byte format? What happens is that ProDOS splits the block numbers, storing all the low bytes in the first 256 bytes of the index block, and all the high bytes in the second 256 bytes of the block. So to tell whether the file is stored at block 07 or $107, you have to read both halves of the index block.

To help understand the ProDOS binary tree file structure, the following short Applesoft program will create a Tree file that will exactly fill a newly formatted ProDOS disk:

```
10    D$ = CHR$(4)
20    PRINT D$;'OPEN MAXTREE,L256'
30    FOR REC = 0 TO 539
40    PRINT D$;'WRITE MAXTREE,R';REC
50    PRINT REC
60    NEXT
70    PRINT D$;'CLOSE'
```

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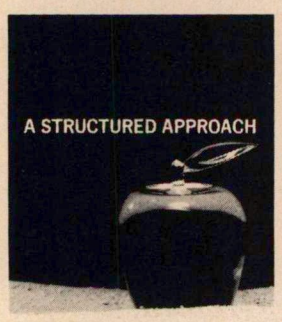

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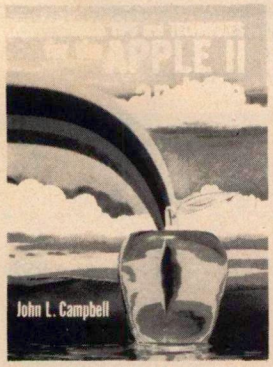

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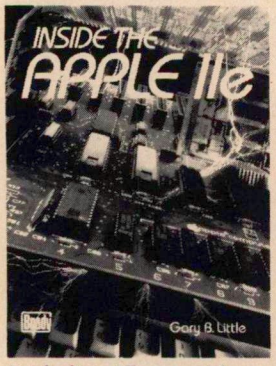

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Circle 59 on Reader Service Card

This program creates file MAXTREE, writes 540 records of 256 bytes (1 sector) each, and the record number is written as the only data in each record. Make sure you don't save anything on the disk before running the program. Then after running it, use your Zap program to look for the data and index blocks. Don't forget to check the second half of the index blocks for the high byte of the block numbers.

The ProDOS directory has a "Volume Entry" at the beginning of the directory, block 02 (track 0, sector 4). The volume entry starts with 4 bytes that point to block 03 as the next directory block, followed by 39 bytes that contain the volume name and details of the disk structure. You normally won't need to use any of this information when trying to find a file, but Figure 5 identifies each piece of information if you should need it.

The bottom of Figure 5 shows two File Entries. Each entry is 39 bytes long. The first byte serves two functions. The first "half" (nibble) of the byte identifies the file type as related to the Seedling–Sapling–Tree format, as well as files which are directory types. (ProDOS allows creation of "files" which are new directories—a subject I will not discuss as it is well presented in the Apple ProDOS manuals). The second half of the first byte specifies the number of letters in the file name, and is followed by the file name itself. After the file name, a single byte specifies the type of information in the file—the codes are listed in Figure 5. The next two bytes specify the block number of the "Key Block." This is the most important piece of information in the file entry, since it tells you where to begin looking for the file. The remainder of the file entry has quite a bit of information in it, but nothing really relevant to finding the file. Note that date entries are stored in packed form as described above for Pascal, but the Day and Month values are reversed (Pascal: Year–Day–Month; ProDOS: Year–Month–Day).

Summarizing, the steps to find an Apple II ProDOS file are:

1. Read the directory sectors D1–D8 at Track 0, starting at ProDOS logical sector 4 and moving toward sector $B, until you find the desired file name. If your Zap program is not set for ProDOS sector order, use Figure 1 to translate ProDOS logical sector numbers to the appropriate sectors (or blocks) for your Zap program.
2. Once you find the file name, note the first half of the byte just to the left of the file name and determine from the list in Figure 5 if the file is Seedling, Sapling, or Tree. Then count 16 bytes to the right of the first letter of the file name and note the two-byte number of the key block. Don't forget to reverse the low/high byte order when decoding this block number. Use Figures 1 and 5 as necessary to identify the Track and Sector (or block) where the key block is located.
3. Read the key block. If the file is a Seedling, this block is all there is to the file. If the file is a Sapling, the key block will be a list of the blocks containing the file; note the blocks, decode them into track/sectors or blocks for your Zap program and read the file sectors. When reading index blocks, you must read both halves of the index block to get the low and high bytes of the data block numbers.
4. If the file is a Tree, the key block is a list of index blocks containing lists of file blocks. You must read the Tree block first, then read the index blocks in the order as listed in the Tree block, and finally read the file blocks themselves in the correct order. I would not recommend attempting to read a file as large as a Tree with a Zap program that was not sectored for ProDOS. A ProDOS Zap program, such as A.P.P.L.E.'s *ProZAP*, is well worth the price in time saved.

Conclusion

Learning to use a Zap program can go a long way toward relieving anxieties that are common to the microcomputer user. Knowing how to directly access and look at what you put on a disk is a great help in debugging programs and understanding what commercial software does with your data. Zapping will also lead you to the knowledge of how to recover information that would be lost to others. But beware! As your confidence grows, you must resist the temptation to ignore the Number 1 caveat of all users of computers—big or small: Don't neglect to back up your files!

REFERENCES

1. *Beneath Apple DOS*, Don Worth and Pieter Lechner, Quality Software, 1981.
2. *All About DOS (Call –A.P.P.L.E. In Depth, Number Three)*, Apple PugetSound Program Library Exchange.
3. *Disk Mapping the Z–80 CP/M System*, Art Messler, *Call –A.P.P.L.E.*, December 1982, pp. 45–46.
4. *All About Pascal (Call –A.P.P.L.E In Depth, Number Two)*, Apple PugetSound Program Library Exchange, 1982, pp. 111–112.
5. *Beneath Apple ProDOS*, Don Worth and Pieter Lechner, Quality Software, 1984.
6. *A.P.P.L.E. Presents: ProZAP*, Apple PugetSound Program Library Exchange, 1983.

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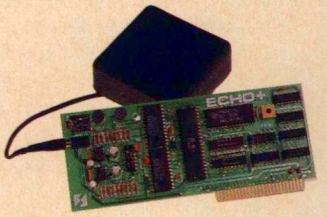

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ProDOS Prose

Extended HELP for ProDOS

Ken Kashmarek

IN THIS issue of ProDOS Prose, we will take a look at one of the new ProDOS "added" commands: HELP. The HELP command is on the /EXAMPLES diskette that comes with *Basic Programming With ProDOS* (Apple product number A2D–2037). The HELP command provides online reference to ProDOS information while the user is learning ProDOS. Of particular interest is the data file used by the HELP command. /EXAMPLES/HELPSCREENS is a random access file containing the help screen entries for the HELP command.

While discussing the HELPSCREENS file, we will use an Applesoft program to display and manipulate the file entries. This program is assisted by an assembly language routine which performs ProDOS block access among other things. While doing all of this, we will cover ProDOS topics in file structures, loading an assembly language program, accessing ProDOS blocks on disk, and use menus from Applesoft to pull it all together.

Help Help

The ProDOS HELP command is installed by entering –/EXAMPLES/HELP. Entering the HELP command (no operands) will display the initial help screen:

```
HELP (a user- added command)
To use, type:       HELP XXX (XXX's below)
Explanatory:        HELP, SYNTAX, BINARY, FILE
Using Files:        CAT, CATALOG, PREFIX, CREATE, RENAME, DELETE,
                    LOCK, UNLOCK
BASIC in Files:     - , LOAD, RUN, SAVE
Programming:        CHAIN, STORE, RESTORE, PR#, IN#
Text in Files:      OPEN, CLOSE, WRITE, READ, APPEND, POSITION,
                    FLUSH, EXEC
Binary Files:       BLOAD, BRUN, BSAVE
```

Entering HELP with one of the above keywords will produce a one screen display (40 columns) that will provide assistance on ProDOS. There are 33 entries in the file, including one for HELP and two for the new intelligent run command ("–" and "DASH"). While the help screens are useful, the interesting item is the file itself. A partial CATALOG listing of the /EXAMPLES disk provides the following:

```
/EXAMPLES

NAME          TYPE  BLOCKS  MODIFIED          CREATED           ENDFILE   SUBTYPE

HELP          BIN   5       1-OCT-83 0:00     5-JUL-84 22:03    1537      A=$2000
HELPSCREENS   TXT   60      1-OCT-83 0:00     5-JUL-84 22:04    12358656  R= 512
```

The help screens data file is a random access text file with a record length of 512 bytes, but check out the end of file marker and the number of blocks for the file.

Each block on a ProDOS disk is 512 bytes. With only 33 help screen entries, why does the file take 60 blocks and have such a large end of file marker? Closer examination reveals that this file is a sparse random access file, and is stored as a "tree" file. The simplest ProDOS file, called a "seedling" file, has a single data block with an end of file marker less than or equal to 512 bytes. The next file type is called a "sapling" file, and has an end of file marker greater than 512 bytes but less than or equal to 131072. The tree file has an end of file marker greater than 131072 but less than 16 megabytes (16777216).

Since HELPSCREENS has a record length of 512, the number of records in the file corresponds to the number of data blocks. The remaining blocks in the file include the master index block for a tree file, and the data index blocks (as we will see later, there are also two empty data blocks in the file).

Help Random

This help screen is not found in HELPSCREENS. So, how does a file with only 33 entries end up with such a large end of file marker? It turns out that each help screen entry is written to the file by creating a "hashcode" from the first three bytes of the keyword. Thus, to add the entry for "HELP," the letters "HEL" are processed by a hashing algorithm to generate a random access record number of 8364. This record number is then used by ProDOS to create the byte address of the record in the file (4282368). The byte address is then converted to the block number, and the record is added to the file. This particular hashing algorithm generates record number 1552 (byte address 794624) for "APPEND" all the way up to record number 24137 (byte address 12358144) for "WRITE." A tree file can have a maximum of 32768 data blocks. Note the end of file marker is 12358656, which is 12358144 + 512.

At this point, let's turn to the Extended Help Applesoft program, (Listing 1) which you may want to key in or download from The Source. Below is the main menu that you should see on startup of the program:

```
Main Menu          ESC → Quit
.....................................

   Main Menu

   [H] Set Help File Information
   [D] Display Help File Entry
   [P] Printer Control Setup
   [C] Copy Help File Entry
   [U] Update Help File Entry
   [Q] Quit

   [ ] Enter Selection
```

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Listing 1

```
100  REM  Extended HELP For ProDOS

105  REM (C) 1984 By Ken Kashmarek

110 SR$ = "": IF  PEEK (116) <  >
     148 THEN  GOSUB 1000: GOSUB
     915: REM Load Hashcode Progr
     am
115 MM$ = "Main Menu":QU$ = "Quit
    ":SH$ = "Help File Info":PT$
     = "Set Pathname":RH$ = "Rea
    d Help File":PC$ = "Printer
    Controls":PS$ = "Set Printer
     String":HEX$ = "0123456789A
    BCDEF":BN$ = "Key Block"
120 SS$ = "Set Printer Slot":CH$ =
    "Copy Help Data":UH$ = "Upda
    te Help File":HR$ = "Hit Ret
    urn To Proceed ":EK$ = "Ente
    r Keyword ":D$ =  CHR$ (4):G
    $ =  CHR$ (7):DSLOT = 6:SL =
    0: DIM MI%(127),IB%(255),FE$
    (30),FF$(30)

125 SP$ = "": FOR I = 1 TO 13:SP$
     = SP$ + "      ": NEXT
130 US$ = "": FOR I = 1 TO 15:US$
     = US$ + "_____": NEXT :US$ =
    US$ + "_____"
135  PRINT  CHR$ (21);: TEXT : HOME
    : PRINT D$"PREFIX": INPUT PX
    $:PF$ = PX$: IF  RIGHT$ (PF$
    ,1) = "/" THEN PF$ =  LEFT$
    (PF$, LEN (PF$) - 1)
140  REM Setup Screen Area
145  PRINT  CHR$ (21);: HOME : PRINT
     " ";

150  VTAB 2: HTAB 1: PRINT  LEFT$
    (US$,39): POKE 34,2: POKE 35
    ,23
155 VT = 3:HT = 1:MENU$ = MM$:ESC
    $ = QU$: GOSUB 765
160  VTAB VT + 3:H = HT + 2: HTAB
    H: PRINT "[H] Set Help File
    Information": PRINT : HTAB H
    : PRINT "[D] Display Help Fi
    le Entry"
165  PRINT : HTAB H: PRINT "[P] P
    rinter Control Setup": PRINT
    : HTAB H: PRINT "[C] Copy He
    lp File Entry"
170  PRINT : HTAB H: PRINT "[U] U
    pdate Help File Entry": PRINT
    : HTAB H: PRINT "[Q] Quit";

175  GOSUB 720: ON S$ = "H" GOTO
    200: ON S$ = "D" GOTO 260: ON
    S$ = "P" GOTO 420: ON S$ = "
    C" GOTO 480: ON S$ = "U" GOTO
    565: ON S$ = "Q" OR S = 27 GOTO
    180: PRINT G$;: GOTO 175
180  REM Quit
185 VT = 3:HT = 1:MENU$ = "Finish
    ed":ESC$ = "+": GOSUB 765
190  VTAB VT + 3:H = HT + 2: HTAB
    H: PRINT "Extended Help Retu
    rning To": HTAB H: PRINT "Ap
    plesoft And BASIC.SYSTEM.": PRINT
    : HTAB H: PRINT "To Start Th
    e Program Again,": HTAB H: PRINT
    "Enter RUN And Hit Return."
195  PRINT : HTAB H: PRINT "To Co
    ntinue Without Destroying": HTAB
    H: PRINT "Your Parameter Val
    ues, Enter": HTAB H: PRINT "
    CONT And Hit Return (In Case
    ": HTAB H: PRINT "You Hit ES
    C One Too Many Times).": TEXT
    : VTAB 23: END : GOTO 140
200  REM Help File Information
205 VT = 5:HT = 3:ESC$ = MENU$:ME
    NU$ = SH$: GOSUB 765
210  VTAB VT + 4:H = HT + 2: HTAB
    H: PRINT "[P] Set Help File
    Pathname": PRINT : HTAB H: PRINT
    "[K] Set Key Block Number"
215  PRINT : HTAB H: PRINT "[D] D
    isplay File Structure"
220  GOSUB 720:M$ = ESC$: ON S =
     27 GOTO 155: ON S$ = "D" GOTO
     305: ON S$ = "P" GOTO 225: ON
     S$ = "K" GOTO 245: PRINT G$;
    : GOTO 220
225 VX = 15: GOSUB 845: ON RESP$ =
    "" GOTO 235:PF$ = RESP$: ONERR
     GOTO 240
230  PRINT D$"VERIFY";PF$: POKE 2
    16,0:DSLOT =  PEEK (48944) /
    16
235 ESC$ = M$:MENU$ = SH$: GOSUB
     785: GOTO 220
240  POKE 216,0: VTAB 15: HTAB H:
     PRINT G$"PATH NOT FOUND"; SPC(
    17): PRINT : HTAB H: PRINT  SPC(
    31): GOTO 235
245 ESC$ = "":MENU$ = BN$: GOSUB
     785:PMT$ = "Enter Key Block
    ": GOSUB 710
250  ON RESP$ = "" GOTO 235:KEYBL
    OCK =  VAL (RESP$): VTAB 17:
     HTAB H: PRINT "Key Block: "
    ;KEYBLOCK;" ";:X = KEYBLOCK

255 CX$ = "$": FOR J = 3 TO 0 STEP
     - 1:Y = X -  INT (X / 16 ^
    J) * 16 ^ J:X =  INT (X / 16
     ^ J):CX$ = CX$ +  MID$ (HEX
    $,X + 1,1):X = Y: NEXT : PRINT
    "   "CX$: GOTO 235
260  REM Display Help File Entry
265 M$ = ESC$:ESC$ = "":MENU$ = R
    H$: GOSUB 785:PMT$ = EK$: GOSUB
    710
270  ON RESP$ = "" GOTO 140:KEY$ =
    RESP$: GOSUB 800
275 N = 0:NB = 0: GOSUB 810: ON S
    = 27 GOTO 140
280  GOSUB 925: ON EC > 0 GOTO 29
    5: GOSUB 820: ON S = 27 GOTO
    140: ON N = 0 OR NB = 0 GOTO
    300: TEXT : HOME
285  IF SL THEN  PRINT D$"PR#";SL
    : IF CW$ <  > "" THEN  PRINT
    CW$;
290  FOR I = 1 TO N: PRINT FE$(I)
    : NEXT : IF SL THEN  PRINT D
    $"PR#0"
295  VTAB 24: HTAB 1: PRINT HR$;:
     GOSUB 740: ON S <  > 13 AND
    S <  > 27 GOTO 295
300 ESC$ = M$: GOTO 140
305  REM Display Help File Struct
    ure
310  IF KEYBLOCK = 0 THEN  GOSUB
    875: ON RC > 0 GOTO 410: IF
    KEYBLOCK = 0 THEN  VTAB 17: HTAB
    HT + 2: PRINT G$"Keyblock Mu
    st Be Set"; SPC( 6): GOTO 23
    5
315  HOME
320  &  PEEK 115,BUFFER:DIRECTRY =
    BUFFER + 512
325 B1 = DIRECTRY:B2 = KEYBLOCK: GOSUB
    970: ON RC > 0 GOTO 410:MI =
    0: IF SL THEN  PRINT D$"PR#"
    ;SL: IF CW$ <  > "" THEN  PRINT
    CW$;
330  PRINT : PRINT "MASTER INDEX
    BLOCK = ";KEYBLOCK
335  FOR I = 0 TO 127: &  USR DIR
    ECTRY + I,BN:MI%(I) = BN: NEXT

340 TB = 0: FOR I = 0 TO 127: IF
    MI%(I) = 0 THEN 390
345  GOSUB 755: IF S = 27 THEN  GOSUB
    750:ESC$ = "":X =  PEEK (37)
    : GOSUB 785: VTAB X + 1: GOTO
    410
350 IB = MI%(I):B1 = DIRECTRY:B2 =
    IB: GOSUB 970: ON RC > 0 GOTO
    410:DB = 0:MI = MI + 1
355  PRINT : PRINT  TAB( 6);"INDE
    X BLOCK = ";IB;", RELATIVE I
    NDEX = ";I
360  FOR J = 0 TO 255: &  USR DIR
    ECTRY + J,BN
365 IB%(J) = BN: IF BN = 0 THEN 3
    85
370 B1 = BUFFER:B2 = BN: GOSUB 97
    0: ON RC > 0 GOTO 410:DB = D
    B + 1
375  PRINT  TAB( 12);"DATA BLOCK
    = ";BN;", RECORD=";I * 256 +
    J;", BYTE=";I * 128 * 1024 +
    J * 512;", KEYWORD="; CHR$ (
    34);: FOR K = 0 TO 9: PRINT
     CHR$ ( PEEK (BUFFER + K));:
     IF  PEEK (BUFFER + K) < 65 THEN
    K = 10
380  NEXT : PRINT  CHR$ (34)
385  NEXT :TB = TB + DB
390  NEXT
395  PRINT : PRINT  TAB( 12);"TOT
    AL DATA BLOCKS = ";TB
400  PRINT : PRINT  TAB( 6);"TOTA
    L INDEX BLOCKS = ";MI
405  PRINT : PRINT "TOTAL FILE BL
    OCKS = ";1 + MI + TB: IF SL THEN
     PRINT D$"PR#0"
410  VTAB 24: HTAB 1: PRINT HR$;:
     GOSUB 740: ON S <  > 13 AND
    S <  > 27 GOTO 410
415 ESC$ = M$: GOTO 140
420  REM Printer Controls
425 VT = 5:HT = 3:ESC$ = MENU$:ME
    NU$ = PC$: GOSUB 765
430  VTAB VT + 4:H = HT + 2: HTAB
    H: PRINT "[S] Slot # For Pri
    nter": PRINT : HTAB H: PRINT
    "[C] Control String For Prin
    ter"
435  GOSUB 720: ON S = 27 GOTO 15
    5:M$ = ESC$: ON S$ = "S" GOTO
    465: ON S$ = "C" GOTO 440: PRINT
    G$;: GOTO 435
440 ESC$ = "":MENU$ = PS$: GOSUB
    785
445  VTAB 24: HTAB 1: PRINT "Ente
    r Printer String ";:CW$ = ""

450  GOSUB 740: IF S <  > 13 THEN
    CW$ = CW$ + S$: GOTO 450
455  IF CW$ <  > "" THEN CX$ = "$
    ": FOR J = 1 TO  LEN (CW$):X
    =  ASC ( MID$ (CW$,J,1)):HI
    =  INT (X / 16):LO = X - HI
    * 16:CX$ = CX$ +  MID$ (HEX
    $,HI + 1,1) +  MID$ (HEX$,LO
     + 1,1) + " ": NEXT : VTAB 1
    5: HTAB H: PRINT "Control St
    ring:": PRINT : HTAB H: PRINT
    CX$
460 MENU$ = M$:ESC$ = MENU$:MENU$
     = PC$: GOSUB 785: GOTO 435
465 ESC$ = MENU$:MENU$ = SS$: GOSUB
     785
470 PMT$ = "Enter Slot Number ": GOSUB
     710:SL =  VAL (RESP$): IF SL
    < 0 OR SL > 7 THEN  PRINT G
    $;: GOTO 470
475  VTAB 13: HTAB H: PRINT "Prin
    ter Slot: ";SL;" (0 = Screen
    )": GOTO 460
480  REM Copy Help Ent9y
485 VT = 5:HT = 3:ESC$ = MENU$:ME
    NU$ = CH$: GOSUB 765:N = 0:N
    B = 0
490  VTAB VT + 3:H = HT + 2: HTAB
    H: PRINT "[K] Keyword For He
    lp Entry"
495  PRINT : HTAB H: PRINT "[P] P
    athname For Output File": PRINT
    : HTAB H: PRINT "[R] Run The
     Copy Program"
500  PRINT : HTAB H: PRINT "Help
    Keyword: ";KEY$
505  PRINT :RESP$ = HO$: GOSUB 86
    0
510  GOSUB 720: ON S = 27 GOTO 15
    5:M$ = ESC$
515  ON S$ = "P" GOTO 520: ON S$ =
    "K" GOTO 530: ON S$ = "R" GOTO
    545: PRINT G$;: GOTO 510
520 VX = 16: GOSUB 845:HO$ = RESP
    $
525 ESC$ = M$:MENU$ = CH$: GOSUB
     785: GOTO 510
530 ESC$ = "":MENU$ = EK$: GOSUB
    785:PMT$ = EK$: GOSUB 710
535  ON RESP$ = "" GOTO 525:KEY$ =
    RESP$: GOSUB 800
540  GOSUB 810:MENU$ = M$: GOSUB
    785: GOTO 485
545  GOSUB 925: IF EC > 0 THEN 70
    0
550  PRINT D$"OPEN";HO$: PRINT D$
    "WRITE";HO$
555  FOR I = 1 TO N: PRINT FE$(I)
    : NEXT
```

```
560  PRINT D$"CLOSE";HO$: GOTO 54
     0
565  REM Update (Replace) Help En
     try
570 VT = 5:HT = 3:ESC$ = MENU$:ME
     NU$ = UH$: GOSUB 765:N = 0:N
     B = 0
575  VTAB VT + 3:H = HT + 2: HTAB
     H: PRINT "[K] Keyword For He
     lp Entry"
580  PRINT : HTAB H: PRINT "[P] P
     athname For Input File": PRINT
     : HTAB H: PRINT "[R] Run The
      Update Program"
585  PRINT : HTAB H: PRINT "Help
     Keyword: ";KEY$
590  PRINT :RESP$ = HI$: GOSUB 86
     0
595  GOSUB 720: ON S = 27 GOTO 15
     5:M$ = ESC$
600  ON S$ = "P" GOTO 605: ON S$ =
     "K" GOTO 615: ON S$ = "R" GOTO
     630: PRINT G$;: GOTO 595
605 VX = 16: GOSUB 845:HI$ = RESP
     $
610 ESC$ = M$:MENU$ = UH$: GOSUB
     785: GOTO 595
615 ESC$ = "":MENU$ = EK$: GOSUB
     785:PMT$ = EK$: GOSUB 710
620  ON RESP$ = "" GOTO 610:KEY$ =
     RESP$: GOSUB 800
625  GOSUB 810:MENU$ = M$: GOSUB
     785: GOTO 570
630  ONERR  GOTO 645
635  PRINT D$"OPEN";HI$: PRINT D$
     "READ";HI$
640  &  INPUT T$:N = N + 1:NB = N
     B +  LEN (T$) + 1:FF$(N) = T
     $: GOTO 640
645  POKE 216,0: IF  PEEK (222) <
      > 5 THEN  PRINT D$"CLOSE": VTAB
     16: HTAB H: PRINT G$"ERROR W
     ITH INPUT FILE": GOTO 700
650  PRINT D$"CLOSE";HI$
655  ON KEY$ =  MID$ (FF$(1),1, LEN
     (KEY$)) GOTO 660: VTAB 14: HTAB
     H: PRINT G$;"ERROR: KEYWORD
     MISMATCH": GOTO 700
660 NX = N:NY = NB:N = 0:NB = 0: GOSUB
     925: IF EC > 0 THEN 700
665  IF NB = 0 OR N = 0 THEN 680
670  IF KEY$ <  >  MID$ (FE$(1),1
     ,L) THEN BYTE = BYTE + 512:B
     N = BN + 1:N = 0:NB = 0: GOTO
     660
675  VTAB 14: HTAB H: PRINT G$"KE
     YWORD ALREADY EXISTS":PMT$ =
     "Okay To Replace " +  MID$ (
     FE$(1),1,L) + " (Y/N) ": GOSUB
     710: IF RESP$ = "" OR RESP$ =
     "N" THEN  GOTO 700
680  PRINT D$"UNLOCK";PF$: PRINT
     D$"OPEN";PF$: PRINT D$"WRITE
     ";PF$;",R";BN
685  POKE 216,0: FOR I = 1 TO NX:
      PRINT FF$(I): NEXT :Z = 511
     - NB: IF Z > 255 THEN Z = 2
     55
690 Z$ = "": FOR J = 1 TO Z:Z$ =
     Z$ +  CHR$ (0): NEXT : PRINT
     Z$;
695  PRINT D$"CLOSE";PF$: PRINT D
     $"LOCK";PF$: GOTO 625
700  VTAB 24: HTAB 1: PRINT HR$;:
      GOSUB 740: ON S <  > 13 AND
     S <  > 27 GOTO 700
705 ESC$ = M$: GOTO 140
710  REM Input A Response
715  VTAB 24: HTAB 1:X =  PEEK (3
     4):Y =  PEEK (35): POKE 34,2
     3: POKE 35,24: CALL  - 868: PRINT
     PMT$;: INPUT "";RESP$: POKE
     34,X: POKE 35,Y: RETURN
720  REM Input A Selection
725  VTAB 24: HTAB HT + 2: PRINT
     "[ ] Enter Selection";: GOSUB
     730: RETURN
730  REM Get Input Character
735  HTAB HT + 3: INVERSE : PRINT
     " ";: NORMAL : PRINT  CHR$ (
     8);
740  WAIT  - 16384,128: GOSUB 755
     : PRINT " "; CHR$ (8);: IF S
      > 32 THEN  PRINT S$;: HTAB
     28
745  IF SL AND S = 16 THEN  PRINT
     D$"PR#";SL: PRINT  CHR$ (9)"
     S";: PRINT D$"PR#0": GOSUB 7
     50: GOTO 740
750  POKE  - 16368,0: RETURN
755 S =  PEEK ( - 16384) - 128: IF
     S < 0 THEN S = 0
760 S$ =  CHR$ (S): RETURN
765  REM Menu Folder
770  VTAB VT: HTAB HT: PRINT " ";
      LEFT$ (US$,18);" "
775  HTAB HT: PRINT "¦";" ";MENU$
     ; LEFT$ (SP$,17 -  LEN (MENU
     $));"\"; LEFT$ (US$,14)
780  FOR I = 1 TO 12: HTAB HT: PRINT
     "¦"; MID$ (SP$,1,33);"¦": NEXT
     : HTAB HT: PRINT "¦"; LEFT$
     (US$,33);"¦";
785  VTAB 1: HTAB 1: CALL  - 868:
      PRINT MENU$;
790  HTAB 19: PRINT "ESC->";ESC$;

795  VTAB 24: HTAB 1: CALL  - 868
     : RETURN
800  REM Obtain Hash Value
805  &  VAL KEY$,HASH:BYTE = HASH
      * 256:BN = BYTE / 512: RETURN

810  REM Display Keyword & Block
     #
815 VT = VT + 2:HT = HT + 2:MS$ =
     ESC$:ESC$ = MENU$
820 MENU$ = "Hashcode Display": GOSUB
     765: VTAB VT + 2:HX = HT + 2

825  PRINT : HTAB HX: PRINT "Keyw
     ord:  ";KEY$: PRINT : HTAB H
     X: PRINT "Hashcode: ";HASH: PRINT
     : HTAB HX: PRINT "Byte #:
     ";BYTE: PRINT : HTAB HX: PRINT
     "Record #: ";BN
830  IF N > 0 AND NB > 0 THEN  PRINT
     : HTAB HX: PRINT "Lines:
     ";N: PRINT : HTAB HX: PRINT
     "Bytes:     ";NB
835  VTAB 24: HTAB 1: PRINT HR$;:
      GOSUB 740: ON S <  > 13 AND
     S <  > 27 GOTO 835
840 MENU$ = ESC$:ESC$ = MS$: GOSUB
     785: RETURN
845  REM Pathname Input
850 ESC$ = "":MENU$ = PT$: GOSUB
     785:PMT$ = "Pathname ": GOSUB
     710: IF RESP$ = "" THEN 870
855  VTAB VX: IF  LEFT$ (RESP$,1)
      <  > "/" THEN RESP$ = PX$ +
     RESP$
860  HTAB HT + 2: PRINT  LEFT$ (R
     ESP$,31);: IF  LEN (RESP$) <
     32 THEN  PRINT  SPC( 31 -  LEN
     (RESP$));
865  PRINT : HTAB HT + 4: PRINT  MID$
     (RESP$,32,29); SPC( 30 -  LEN
     ( MID$ (RESP$,32,29)))
870  RETURN
875  REM HELPSCREEN Keyblock Find

880  &  PEEK 105,SR: &  PEEK 115,
     BUFFER:DIRECTRY = BUFFER + 5
     12
885 B1 = BUFFER:B2 = 2: GOSUB 970
     :EL =  PEEK (BUFFER + 35):EN
      =  PEEK (BUFFER + 36): &  PEEK
     BUFFER + 37,FC: IF RC > 0 THEN
      RETURN
890  FOR BN = 2 TO 5:B1 = DIRECTR
     Y:B2 = BN: GOSUB 970: IF RC >
     0 THEN BN = 6: GOTO 910
895  FOR FE = DIRECTRY + 4 TO DIR
     ECTRY + 4 + (EN - 1) * EL STEP
     EL:LE =  PEEK (FE):LA =  INT
     (LE / 16):LE = LE - LA * 16
900  IF (LA) THEN  POKE SR + 2,LE
     : &  POKE SR + 3,FE + 1: IF
     SR$ = "HELPSCREENS" AND  PEEK
     (FE + 16) = 4 THEN  &  PEEK
     FE + 17,KEYBLOCK:FE = DIRECT
     RY + 512:BN = 6
905  NEXT FE
910  NEXT BN: RETURN
915  REM Install ONERR Fixup Rout
     ine
920  POKE 768,104: POKE 769,168: POKE
     770,104: POKE 771,166: POKE
     772,223: POKE 773,154: POKE
     774,72: POKE 775,152: POKE 7
     76,72: POKE 777,96: RETURN
925  REM Input Help Screen Entry
930 EC = 0: ONERR  GOTO 965
935  PRINT D$"VERIFY";PF$: PRINT
     D$"OPEN";PF$: PRINT D$"READ"
     ;PF$;",R";BN: POKE 216,0
940  &  INPUT T$: IF  MID$ (T$,1,
     1) <  >  CHR$ (0) THEN N = N
      + 1:NB = NB +  LEN (T$) + 1
     :FE$(N) = T$: GOTO 940
945  PRINT D$"CLOSE";PF$: IF N =
     0 OR NB = 0 THEN  RETURN
950 L =  LEN (FE$(1)) - 1: FOR J =
     1 TO L + 1: IF  MID$ (FE$(1)
     ,J,1) = " " THEN L = J - 1:J
      = 256
955  NEXT J: IF KEY$ <  > MID$ (
     FE$(1),1,L) THEN BYTE = BYTE
      + 512:BN = BN + 1:N = 0:NB =
     0: GOTO 930
960  RETURN
965  POKE 216,0: CALL 768:EC =  PEEK
     (222): &  PEEK 218,EL: PRINT
     D$"CLOSE": VTAB 17: HTAB HT +
     2: PRINT G$;"ERROR WITH HELP
      PATHNAME(";EC;")": RETURN
970  REM Access ProDOS Via Read B
     lock
975  &  READ DSLOT,B1,B2,RC: IF R
     C = 0 THEN  RETURN
980  IF RC = 40 THEN  VTAB 17: HTAB
     H: PRINT G$;"NO DEVICE CONNE
     CTED"; SPC( 12): RETURN
985  VTAB 17: HTAB H: PRINT G$;"I
     /O ERROR"; SPC( 21): RETURN

1000  PRINT "Loading HASHCODE.";:
      POKE 48647,158: POKE 48648,
     190: CALL 48888: GOTO 1010
1005 H$ = H$ + "ND9C66": FOR I =
     1 TO  LEN (H$): POKE 511 + I
     , ASC ( MID$ (H$,I,1)) + 128
     : NEXT : POKE 72,0: CALL  -
     144: PRINT ".";: RETURN
1010 H$ = "4000:20 F8 BE A9 02 20
      F5 BE A9 00 8D F6 03 85 42
     A9 98 8D F7 03 85 43 A9 2C 8
     5 3C A9 40 85 3D A9 78 85 3E
      A9 41 85 3F A0 00 20 2C FE
     60 C9 87 D0 3D 20 B1 00 20 F
     8 E6 8A 29 07 F0 2F 0A 0A 0A
      0A 85 ": GOSUB 1005
1015 H$ = "4040:1A 20 BE DE 20 67
      DD 20 52 E7 84 1B 85 1C 20
     BE DE 20 67 DD 20 52 E7 84 1
     D 85 1E A9 03 85 19 20 00 BF
      80 19 00 A8 A9 00 F0 72 4C
     99 E1 C9 E5 D0 54 20 B1 00 2
     0 E3 DF 20 6C DD A0 00 B1 83
      AA C8 ": GOSUB 1005
1020 H$ = "4080:B1 83 85 08 C8 B1
      83 85 09 A0 00 84 06 84 07
     A9 20 E0 01 90 02 B1 08 0A 0
     A 0A 85 07 C8 A9 20 E0 02 90
      02 B1 08 4A 66 06 4A 66 06
     29 07 05 07 85 07 C8 A9 20 E
     0 03 90 02 B1 08 0A 29 3F 05
      06 A8 ": GOSUB 1005
1025 H$ = "40C0:A5 07 18 90 17 C9
      E2 D0 35 20 B1 00 20 67 DD
     20 52 E7 A0 01 B1 50 88 48 B
     1 50 A8 68 20 F2 E2 A5 A2 10
      07 A0 99 A9 47 20 BE E7 20
     BE DE 20 E3 DF 20 6A DD AA A
     5 12 30 03 4C 2B EB 4C 76 DD
      C9 B9 ": GOSUB 1005
1030 H$ = "4100:D0 20 20 B1 00 20
      67 DD 20 52 E7 84 3C 85 3D
     20 BE DE 20 67 DD 20 52 E7 A
     0 01 91 3C 88 A5 50 91 3C 60
      C9 D5 D0 14 20 B1 00 20 67
     DD 20 52 E7 A0 00 E6 51 B1 5
     0 C6 51 18 90 9D C9 84 D0 32
      20 B1 ": GOSUB 1005
1035 H$ = "4140:00 20 E3 DF 20 6C
      DD A2 80 86 33 20 6A FD 86
     06 20 39 D5 A5 06 20 52 E4 A
     2 00 A0 02 20 E2 E5 A0 00 A5
      06 91 83 C8 A5 6F 91 83 C8
     A5 70 91 83 60 4C C9 DE 91 0
     0 00 00 00 ": GOSUB 1005
1040  CALL 16384: RETURN
```

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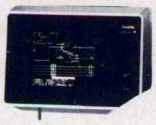

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Option [H] will lead to a secondary menu that will control display of the block structure of HELPSCREENS. This menu and the rest of the program expect that you have available the /EXAMPLES diskette containing the HELPSCREENS file. The [H] menu screen will look like this:

```
Help File Info          ESC → Main Menu
.........................................

Main Menu
    Help File Info

    [P] Set Help File Pathname
    [K] Set Key Block Number
    [D] Display File Structure

[ ] Enter Selection
```

Use [P] to enter the complete help file pathname, and then [D] to display the help file structure. The following is a partial listing of the output:

```
MASTER INDEX BLOCK = 73

    INDEX BLOCK = 72, RELATIVE INDEX = 0
        DATA BLOCK = 71, RECORD = 0, BYTE = 0, KEYWORD = " "

    INDEX BLOCK = 74, RELATIVE INDEX = 6 DATA BLOCK = 75,
        RECORD = 1552, BYTE = 794624, KEYWORD = "APPEND "


    INDEX BLOCK = 129, RELATIVE INDEX = 94 DATA BLOCK = 130,
        RECORD = 24137, BYTE = 12358144, KEYWORD = "WRITE "

        TOTAL DATA BLOCKS = 35

    TOTAL INDEX BLOCKS = 24

TOTAL FILE BLOCKS = 60
```

For any ProDOS file, the initial data block is always allocated. In this case, it is 512 bytes of zeros ($00). There is one other null data block in the file, which may represent a deleted help screen entry. The block numbers represent the location of the help screens file on the /EXAMPLES disk. If you have moved the file to a different diskette by using a copy file operation, these numbers will be different. However, the relative index number, record number, and byte numbers should all be the same. This display, best viewed when output to a printer, presents the tree file structure of a sparse random access text file. The master index block points to the index blocks. The index blocks then point to the data blocks.

The [D] operation will attempt to find HELPSCREENS on the root directory of the ProDOS volume indicated by the pathname given for [P]. If your help screen file is not on the root directory, you can still display the file structure by giving the key block number of the file. The key block number can be determined with the aid of a utility like ProZAP.

More Help For Help

On the Main Menu of Extended Help, option [D] will display the help file entries similiar to the HELP command. [P] will set printer options. When the printer slot is set, [D] from the Main Menu and the [D] from the Help File Info menu will place the output on the printer. Option [C] will copy a help screen entry to a sequential text file. In this form, the help screen can be input to an editor for changes. The

[U] option will copy a screen entry from a sequential text file to the help screens file. With this option, you can add you own help screen entries to the HELPSCREENS file.

Each Main Menu command has its own menu screen to process input to control the Extended Help program. When a keyword is entered for the copy or update function, the following display is shown:

```
Hashcode Display          ESC → Copy Help Data
.........................................................

Main Menu
    Help File Info
        Hashcode Display
        Keyword: HELP
        Hashcode: 16728
        Byte #: 4282368
        Record #: 8364

Hit Return To Proceed
```

This display can be used to determine the hashcode for a new keyword to be added to the file. After the copy or update function has run, this display is repeated with the number of display lines and number of characters in the help screen entry.

If you have a Grappler + printer controller interface, Control–P will dump the current 40 column text screen to your printer when the printer slot has been set via the printer control menu. Control–P may be entered for the screen dump when the message 'Enter Selection' or 'Hit Return To Proceed' appears on the screen. After the screen dump is complete, ESC or Return will proceed to take the appropriate action.

On the menu selection, ESC will normally jump back to the previous menu level, or Quit if used from the Main Menu. If an improper selection is entered, the program will beep to let you know.

So far, this entire process has been rather straightforward. But there is some black magic involved. Actually, it is not black magic, but 'block' magic, or just ProDOS Prose (the inner workings of ProDOS).

Give Me That Old Block Magic . . .

The subroutine beginning with line 1000 will load the assembly language interface for Extended Help (the assembly program is partially shown in Listing 2). The following functions are provided:

& READ slot,buffer,block,returncode

This code is used in lines 345 through 455. The slot must be indicated, a buffer address given, and a block number must be given. This interface will read any block from a ProDOS formatted disk (or DOS 3.3, or Pascal formatted disk for that matter). Returncode will be zero if all went well, or 39 if an I/O error occurred, or 40 if there is no device connected (Extended Help does check these codes; however, you should be certain your diskette is properly inserted).

& VAL string$,hashcode

This function is used is line 805 to convert the keyword string (first three characters) to a hash value. Line 805 then computes the byte number and record number.

& PEEK address,variable

This is the 16 bit PEEK function described in the February 1983 issue of *Call –A.P.P.L.E.* Address indicates

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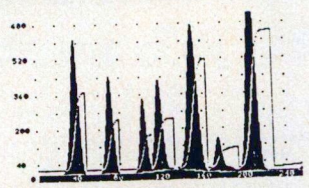

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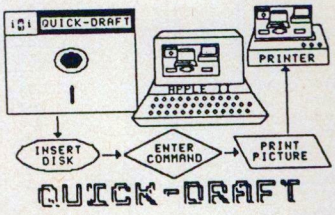

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Listing 2

```
                        ************************************************
                        *
                        * ROUTINE TO HASH 3 CHARS TO RANDOM FILE BYTE #
                        *
                        * USAGE: 100 & VAL STR$,HASH
                        *        110 BYTE = HASH * 256: REM BYTE NUMBER
                        *        120 BLOCK = BYTE / 512: REM RECORD NUMBER
                        *
                        * WHERE: STR$ IS THE STRING WITH THE COMMAND
                        *        HASH IS THE VARIABLE TO RECEIVE THE VALUE
                        *
                        ************************************************
9841: C9 E5             HASHCODE CMP   #$E5        VAL TOKEN
9843: D0 54                      BNE   NOTHASH
9845: 20 B1 00                   JSR   CHRGET
9848: 20 E3 DF                   JSR   PTRGET      GET ADDRESS OF VARIABLE
984B: 20 6C DD                   JSR   CHKSTR      IS IT A STRING?
984E: A0 00                      LDY   #0
9850: B1 83                      LDA   (VARPNT),Y
9852: AA                         TAX   KEEP        LENGTH
9853: C8                         INY
9854: B1 83                      LDA   (VARPNT),Y STRING POINTER
9856: 85 08                      STA   STR
9858: C8                         INY
9859: B1 83                      LDA   (VARPNT),Y
985B: 85 09                      STA   STR+1
985D: A0 00                      LDY   #0
985F: 84 06                      STY   HASH        CLEAR OUT
9861: 84 07                      STY   HASH+1       HASH AREA
9863: A9 20                      LDA   #$20        PRELOAD A BLANK
9865: E0 01                      CPX   #1          CHECK LENGTH OF STRING
9867: 90 02                      BLT   HASH0       =>USE BLANK
9869: B1 08                      LDA   (STR),Y     GET CHAR #1
                                                   ;BITS=76543210
                                                   ;      0xxnnnnn
986B: 0A                HASH0    ASL               ;      xxnnnnn0  0->CARRY
986C: 0A                         ASL               ;      xnnnnn00  x->CARRY
986D: 0A                         ASL               ;      nnnnn000  x->CARRY
986E: 85 07                      STA   HASH+1      AND KEEP FOR NOW
9870: C8                         INY               ;TO NEXT CHARACTER
9871: A9 20                      LDA   #$20        PRELOAD A BLANK
9873: E0 02                      CPX   #2          CHECK LENGTH OF STRING
9875: 90 02                      BLT   HASH1       =>USE BLANK
9877: B1 08                      LDA   (STR),Y     GET CHAR #2
                                                   ;BITS=76543210
9879: 4A                HASH1    LSR               ;      0yymmmmm
987A: 66 06                      ROR   HASH        ;      m00000000  0->CARRY
987C: 4A                         LSR               ;      000yymmm  m->CARRY
987D: 66 06                      ROR   HASH        ;      mm000000  0->CARRY
987F: 29 07                      AND   #%00000111  ;      00000mmm
9881: 05 07                      ORA   HASH+1      ;      nnnnnmmm
9883: 85 07                      STA   HASH+1      KEEP FOR NOW
9885: C8                         INY               ;TO NEXT CHARACTER
9886: A9 20                      LDA   #$20        PRELOAD A BLANK
9888: E0 03                      CPX   #3          CHECK THE STRING LENGTH
988A: 90 02                      BLT   HASH2       =>ITS OKAY
988C: B1 08                      LDA   (STR),Y     GET CHAR #3
                                                   ;BITS=76543210
988E: 0A                HASH2    ASL               ;      0wwkkkkk
988F: 29 3F                      AND   #%00111111  ;      wwkkkkk0  0->CARRY
9891: 05 06                      ORA   HASH        ;      00kkkkk0
9893: A8                         TAY               ;      mmkkkkk0
9894: A5 07                      LDA   HASH+1      ;Y =   mmkkkkk0  LO BYTE
                                                   ;A =   nnnnnmmm  HI BYTE
                                                   ;16 BIT VALUE=nnnnnmmm
                                                        mmkkkkk0
                                                   ;  CHAR #1 =.....
                                                   ;  CHAR #2 =     ... ..
                                                   ;  CHAR #3 =         .....
00000000                                           ;BYTE NUMBER =nnnnnmmm
9896: 18                                                mmkkkkk0 0
9897: 90 17                      BCC   CONVRT
```

```
MASTER INDEX BLOCK = 73

    INDEX BLOCK = 72, RELATIVE INDEX = 0
"         DATA BLOCK = 71, RECORD=0, BYTE=0, KEYWORD="

    INDEX BLOCK = 74, RELATIVE INDEX = 6
          DATA BLOCK = 75, RECORD=1552, BYTE=794624, KEYWORD="APPEND "

    INDEX BLOCK = 76, RELATIVE INDEX = 9
          DATA BLOCK = 77, RECORD=2350, BYTE=1203200, KEYWORD="BINARY "
          DATA BLOCK = 78, RECORD=2447, BYTE=1252864, KEYWORD="BLOAD "
```

which memory locations are to be accessed for a 16 bit value (address for the LO byte; address + 1 for the HI byte). The 16 bit value is returned to variable as an Applesoft floating point value.

& POKE address,value

This is the 16 bit POKE function also described in the February 1983 issue. The Applesoft floating point value is converted to integer and placed in memory at the location indicated by address (LO byte in address; HI byte in address + 1).

& USR address,variable

This function accesses the 16 bit block number from the master index record or the data index record that was read into memory. See line 335 and line 360 in the Applesoft program listing. The LO byte is obtained from memory location address while the HI byte is obtained from location address + 256.

& INPUT string$

This function provide the 'Input Almost Anything' function from In Depth #1: All About Applesoft. This is used to read the help screen lines, many of which contain commas and colons.

The assembly language routine may be installed by running Extended Help, or by assembling the source code, and BRUNning the object file. The program was assembled with Merlin.Pro and loads at $4000. It relocates itself above the ProDOS temporary buffer (also sets up the ampersand vector).

The & READ routine sets up the ProDOS parameter list and performs the READ BLOCK MLI (Machine Language Interface) call. This interface is used to find the HELPSCREENS entry in the root directory (blocks 2, 3, 4, and 5 of any ProDOS formatted disk). It is also used to read the index blocks (master and data index) as well as the data blocks in the Display File Structure option of Help File Info. This routine, combined with PEEK, & PEEK, and & USR will allow your programs to access and map an entire ProDOS disk. Further information can be found in *Basic Programming With ProDOS* and the *ProDOS Technical Reference Manual*, both from Apple Computer, Inc.

& USR provides the block number of an index record (if taken from the master index of a tree file), or the block number of a data record when taken from an index record. The block numbers in the index records are not stored in LO/HI byte pairs as are memory pointers. Instead, the LO bytes are stored in the first 256 bytes of the the index block, and the HI bytes are stored in the last 256 bytes of the index block.

Let's Settle This Hash

Now, about that 'hashing algorithm' stuff. In the HELP command, a null entry is internally converted to 'HELP' and the characters 'HEL' are hashed to the proper random access byte number. Note that '–' and 'DASH' are two separate entries on the file (they do not hash to the same byte number). A null keyword or three spaces (' ') actually hashes to a byte number of zero (0), but the HELP command also converts this to 'HEL'.

The algorithm is given in lines 152 through 193 of the assembly language listing. The range of input is limited to the characters from "A" ($41) to " "($95). Thus, "AAA" and "aaa" would hash to the same value (also "!!!"). The range is then reduced to values 0 through 31 with 32 distinct values for each character. With three characters as input, this could generate up to 32768 possible record number outputs (32 * 32 * 32 = 32768). Recall that the maximum number of blocks in a ProDOS file is 32768 (32768 * 512 = 16777216).

This algorithm is a simple one-to-one hash. That is, for each possible input (upper case character string range), there is exactly one output that can be used to determine where the help screen entry is stored. In this case, the input is the first three characters of the help keyword and the output is the unique record number for the help screen entry. Note however that CAT and CATALOG would generate the same hash location. This leads to the more common type of hashing algorithm.

In order for CAT and CATALOG to be placed on the file, a different record number must be generated. When two or more keywords, or keys, hash to the same location, this is referred to as a collision. The collision is resolved by an extension to the basic algorithm. The extension involves searching for an empty record beginning with the generated record number. Therefore, when CAT was added to the file, it occupied record 3124, which is the record number produced by the hashing algorithm. In order to store the entry for CATALOG, which generates the same record number, we must search for an empty record. The search algorithm used here is very simple. Simply increment the record number by one and use that record.

Since HELPSCREENS has only one collision, this technique will suffice. The present hashing algorithm and search technique

attempts to perform one hash, and at most one search for the one collision, in order to keep it simple. However, this is done at the price is having a full tree file with many index blocks. At least three blocks are read for each access (master index block, data index block, and data block). We can get by with a sapling file (up to 256 data blocks) by using a more sophisticated hashing algorithm and search technique to handle collisions.

We can limit the file size by simply dividing the generated record number by 128. This is the number of index blocks pointed to by the master index block. Thus, the hashing algorithm is not that much more difficult, but the search technique will be. The technique of incrementing the record number is simple enough, but we now face the possibility of multiple collisions. That is, the new record number may also point to a block that already has data in it. Also, what happens when the last block (#255) is accessed and it already contains a record. In this case, the sequential search must wrap around to the beginning of the file.

As this file becomes full, the probability of a collision becomes greater. Eventually, the search involves reading the entire file to find an empty spot for a new record to be inserted. Also, the search is elongated in order to find a record for display. From this you can conclude that efficient hashing algorithms require overallocated file space in order to reduce the search time for collisions. An additional technique for reducing the search time would be to have a bit map in the file for the allocated blocks. This would eliminate having to read each data block to find an empty record position.

The sapling file will require two block accesses for each record (the index block and the data block). However, the index block will always be in the file buffer. This will be offset somewhat since some or our 33 help screen entries will have collisions in the hashed record number, and will require additional block accesses to resolve the collision.

The final technique for the help screen entries does not involve a hashing algorithm. It is strictly a sequential search. However, rather than sequentially searching a data file, we will let ProDOS sequentially search a directory block for the file. With this technique, we will need three directory blocks for a sub– directory for the help screen files. Finally, we will have 33 seedling files for the actual help screen data (actually 32 since "–" must be converted by the accessing program to "DASH"). In this technique, the key for the file is simply the filename and must be an exact match.

Obviously, the seedling file technique would not have exploited the tree file structure and denied you the opportunity to learn about sparse random access files. The sapling file technique would have been slow at some point, especially if more entries are added to the file. Note the absence of many ProDOS commands and keywords (VERIFY, FRE, TYPE, SYSTEM, SYS, BAS, RANDOM, SEQUENTIAL, ERRORS, etc.) In most data base implementations, variations of this and other techniques are used.

The common "indexed" file structure uses a separate index file or data index records within the data base file. These data index entries are actually the keywords or keys, with pointers to the data records. While such techniques represent efficiencies for large data base files, they also add to the complexity of the file and the access techniques. Another consideration deals with space for data base files. The sparse file saves space on the disk, but is considered generally inefficient for large data base applications.

A final note on the tree file structure. Go back to the partial display of the HELPSCREENS tree file structure. First of all, all ProDOS files start out as seedling files with one data block as the first block allocated. Thus, the lowest block number in HELPSCREENS is block 71, which is the first data block (empty by the way). When a file grows beyond 512 bytes, it becomes a sapling file, and acquires an index block. This is the second block allocated in the file (block number 72). In the case of HELPSCREENS, the first record added had record number 1552, which immediately made the file a tree file. Thus, the next block acquired is master index block (block number 73). Since the APPEND entry did not fit into the range of the first index block, and the file is now a tree file, the next block acquired is a second index block (block number 74). Great. The file already has four blocks and still no data. At last, the data block for the APPEND entry is acquired (block number 75).

This was rather easy to follow since HELPSCREENS was added to the EXAMPLES disk in a fashion that all of the blocks came in a sequential fashion from the free space bit map. If the entries were added in a different order, the block numbers would also be different. Adding the first data record took five trips to the free space bit map, while subsequent data records take one or two trips.

Help For You

We covered a lot of ground with this pass. On /EXAMPLES, we found the HELP command which makes it a little easier to learn ProDOS. We also found a seemingly large random access text file with the help screen entries. With the aid of Extended Help, we reviewed the structure of a tree file, and examined the HELP command hashing technique for the help screens file. In doing so, the ProDOS MIL call for block read was used, along with other ampersand routines which are used to access the ProDOS file information, including a search of the root directory of a diskette. That ampersand routine is loaded above the ProDOS temporary buffer, and the Applesoft program used some slick menus to bring this whole package your way.

Finally, we touched lightly on some basic techniques in hash and search algorithms. Altogether, we covered topics in data management using the HELPSCREENS file as an example. Your needs may be very different. In particular, longer keys require more complex hashing algorithms. As the file gets larger, the process becomes more complex. As an exercise for the reader, determine the size of the key portion of the social security file (social security number is 9 digits). Next, design an efficient algorithm for accessing the keys only. Finally, submit your best estimate of the access time for one key (use floppy disk drive times first, then move on to faster devices). Have fun!

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THE Spreadsheet Sheet Data Analysis — Part 9: Analysis of Variance

Jeffrey M. Jacques, Ph.D.

LAST time we used the F-distribution to test for statistical significance among pairs of variables as summarized by the regression equation or Eta² statistics. In addition, we completed our general template for contingency table analysis. This month we will begin our direct examination of the most often reported application of the F-distribution—i.e., analysis of variance—and build a general template using *THE Spreadsheet.*

Analysis of Variance, T-Tests, and Regression Equations

Analysis of variance (ANOVA) is a set of procedures which enables us to test specific hypotheses about whether or not two or more groups in our study came from the same or different population. It can be used to answer directly our question posed in the first article: Based on our random sample data, did men and women at this college earn different mean salaries?

Analysis of variance is a special case of what is called the general linear model. In simple regression analysis, we noted the formula:

Variable of Interest = intercept point + slope * Explanatory Variable + e or:

$$Y = A + B_1 X + e$$

Now, if we partition the explanatory variable (Xi) into each attribute, then our equation becomes:

$$Y = A + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_n X_n$$

For example, using the explanatory variable of degree, X_1 = only those holding the bachelor's degree, X_2 = only those holding master degrees, and X_3 would be only those holding the doctorate. In this model, Xi is always equal to 0 or 1. We could compute the estimate of each slope (bi) and then compare each slope to zero. This is basically what we did last time when we tested for significance the association between the variables of income and sex (i.e., when we found no significant association between these variables.)

What happened when we examined the explanatory variable and we did not wish to assume that a straight line was the best summary of the data? Well, we reported Eta², which used the category means rather than the regression equation. But, when we used contingency table analysis, we lost a considerable amount of information because we collapsed all the income data into four or fewer categories.

We can use all the information in the variable of interest and test to see if at least the two most extreme category mean values are reliably different from each other with ANOVA. When we are working with a variable of interest where it makes sense to compute the mean and standard deviation values, then we may compute separate means and standard deviations on the variable of interest for each attribute of the explanatory variable. For example, the average salary of those holding the baccalaureate degree, the average salary of those holding the master's degree, and the average salary of those holding the doctoral degree.

The basic idea of ANOVA is to assume first that each attribute of the explanatory variable has the same population variance. If we assume this to be true, then the variance of all the scores taken together can be partitioned into: (1) the amount of variance within each attribute or category—as measured from its category mean value(s), and (2) the amount of variance explained by the differences among the category mean values and the grand or total mean value. This may be expressed as:

TABLE 9.1 ONEWAY ANALYSIS OF VARIANCE TABLE

Source of Variation	Sum of Squares	df	MS	F-ratio
Explained Variation	SUM(N*(Cat. Mean - Y)^2)	k - 1	SSe/dfe	MSe/MSu
Unexpl. Variation	SUM(Yi - Cat.Mean)^2	N - k	SSu/dfu	
Total	SUM(Yi - Y)^2	N - 1		

Total Variation = Explained (between) Variation + Unexplained (within) Variation

Or, stated empirically,

SUM(Yi - MeanY)² = (Cat. Mean - MeanY)² - (Yi - Cat. Mean)²

where:

Yi	=	each value on the variable of interest
MeanY	=	mean of all values or grand mean value
Cat. Mean	=	each attribute of the explanatory variable mean value

If the attribute population means are not different from one another, then the sample means would only differ slightly due to sampling error. Alternately, if the population means are actually different from each, then the estimates of the variance measured by the differences between the category sample means and the grand mean will be quite large and the ratio of the "explained variation" to the "unexplained variation" must be large.

Perhaps the best way to master the computations needed for one way ANOVA is to use an ANOVA table. See Table 9.1.

The far right column is the F-ratio. It is simply the ratio of the estimates of how much variation is explained by the category mean (MSe) values to that portion still left unexplained (MSu) by the differences between the actual value and its category mean value. In order to estimate these population parameters we must first compute the degrees of freedom. As we did for Eta², the "explained degrees of freedom" is computed from the number of attributes of the explanatory variable, or k - 1, and the "unexplained degrees of freedom" is computed from the total number of cases minus the number of attributes. The sum of squares may be computed from knowledge of the mean and standard deviation values.

Once the F-ratio is computed, we may turn to our old friend, the F-distribution, to test for statistical significance. Before we test for statistical significance, however, it is essential to make sure that we are not violating an important assumption of ANOVA, to wit: equal population variances for each of the attributes of the explanatory variable. One approach to testing this assumption is to examine the ratio of the maximum and minimum variances on the variable of interest for the explanatory variable. We can do this with the F-max test.

Now that we can satisfy ourselves that the two most extreme variances are not reliably different from one another, we may proceed to execute the ANOVA procedure. When the minimum/maximum shows no significant differences, then we may have considerable faith in the reported ANOVA findings. If we find the F-ratio to be statistically significant, then we may assume that at least the two most extreme attributes, as measured by their mean values, were reliably different from one another. Other differences may be detected by executing "a posteriori"—after the fact—comparisons using Tukey's HSD statistic or, "a priori" contrasts which use the t-test (more on these next time).

We know from our previous work that rank and degree were significant predictors of salary. Therefore, if we ran an ANOVA procedure, we would find that at least the two most extreme attributes (e.g., instructor vs. full professor or bachelor degree holders vs. doctoral degree holders) were reliably different from one another on the variable of income. We found also that sex and years of employment were not significantly linearly related. Since sex has only two attributes, the test of B = 0 is akin to the test of mean differences. Running an ANOVA will not change our conclusion that the earning difference between males and females were not significant.

Still, there were many different values for years employed. Maybe they were not related in a linear fashion, but maybe they were related in some other way. Perhaps new employees and old timers had about the same salaries, while those who had been employed a moderate amount of time made the least? ANOVA is a useful test for examining this type of question.

H_0 : There is no difference between the average salaries for faculty who have worked different periods of time ($u_1 = u_2 = u_3$).

H_1 : There is a significant difference among the average salaries of the faculty who have worked different periods of time ($u_1 <> u_2 <> u_3$).

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TABLE 9.2A

INCOME BY YRSEMP, ANALYSIS OF VARIANCE

```
=====================================================================================
      A          B        C        D        E        F                  G
 1 Template    for   Analysis     of   Variance
 2 -------------------------------------------------------------------------------
 3          Data     Entry    Table:   Income by Yrsemp
 4 =====================================================================================
 5  Variable   Attr.    Attr.    Attr.    Attr.  Total Y
 6 Dimension    #1       #2       #3       #4
 7 -------------------------------------------------------------------------------
 8  Mean            NA       NA       NA       NA       NA
 9 Stand. Dev       NA       NA       NA       NA       NA
10 N of cases       NA       NA       NA       NA       NA
11 -------------------------------------------------------------------------------
12 Enter !!  when finished entering all values.   @IF(@AND(G19=G21,G19=G23),@NA,@ERROR)
                                                          @IF(@SUM(B27...E27)=F10,@NA,@ERROR)
13
14 =====================================================================================
15    A              B         C     D        E          F                  G
16  Computational    Space    Number of indep't variables
17 -------------------------------------------------------------------------------
18                                                                  Total
19 Mean         @IF(@ISNA(B8),0,1)...@IF(@ISNA(E8),0,1)            @SUM(B19...E19)
20
21 St. Dev.     @IF(@ISNA(B9),0,1)...@IF(@ISNA(E9),0,1)            @SUM(B20...E20)
22
23 N of Cases   @IF(@ISNA(B10),0,1)..@IF(@ISNA(E10),0,1)   =>     @SUM(B23...E23)
24
25                                  Number of cases.
26
27 N of Cases   @IF(@ISNA(B10,0,B10).@IF(@ISNA(E10),0,E10)+F10
28 check sum
```

TABLE 9.2B

INCOME BY YRSEMP. ANALYSIS OF VARIANCE-continued

```
=====================================================================================
      A        B        C        D        E        F        G        H        I
47
48 ---------------------------------------------------------------------------------
49                                  .95 Level
50 ---------------------------------------------------------------------------------
51          Where    k = 2    Where  k = 3     Where   k = 4
52            df  Crit. Val     df  Crit. Val     df  Crit. Val
53 ---------------------------------------------------------------------------------
54                4      9.6       4     15.5       4     13.7
55                5     7.15       5     10.8       5     10.4
56                6     5.82       6     8.38       6     8.44
57                7     4.99       7     6.94       7     7.18
58                8     4.43       8        6       8     6.31
59                9     4.03       9     5.34       9     5.67
60               10     3.72      10     4.85      10     4.79
61               12     3.28      12     4.16      12     4.01
62               15     2.86      15     3.54      15     3.54
63               20     2.46      20     2.95      20     3.29
64               30     2.07      30      2.4      30     2.61
65               60     1.67      60     1.85      60     1.96
66              500        1     500        1     500        1
67 ---------------------------------------------------------------------------------
68 Remenber     to    press !    twice.
```

```
48 ---------------------------------------------------------------------------------
49                                  .99 Level
50 ---------------------------------------------------------------------------------
51  Where    k = 2    Where  k = 3     Where   k = 4
52  df  Crit. Val     df  Crit. Val     df  Crit. Val
53 ---------------------------------------------------------------------------------
54      4     23.2       4      37       4      49
55      5     14.9       5      22       5      28
56      6     11.1       6     15.5       6     19.1
57      7     8.89       7     12.1       7     14.5
58      8      7.5       8      9.9       8     11.7
59      9     6.54       9      8.5       9      9.9
60     10     5.85      10      7.4      10      8.6
61     12     4.91      12      6.1      12      6.9
62     15     4.07      15      4.9      15      5.5
63     20     3.32      20      3.8      20      4.3
64     30     2.63      30        3      30      3.3
65     60     1.96      60      2.2      60      2.3
66    500        1     500        1     500        1
67 ---------------------------------------------------------------------------------
```

We can compute: (1) sum of squares, (2) degrees of freedom, (3) the estimates of variation in the population, and (4) the F–ratio. Then, using the degrees of freedom and F–ratio values, determine the level of significance via the F–distribution. But first, we must compute from an earlier worksheet the mean value, the standard deviation, and the number of cases for each attribute of the explanatory variable.

Modifying the Worksheet

Now load your first worksheet—the one which included the essential summary descriptive statistics. As promised, we will work with the variables of faculty income (i.e., variable of interest) and the number of years employed (i.e., explanatory variable). We will divide the explanatory variable into three categories: (i.e., category 1 = less than 2 years; category 2 = 2 through 10 years, and category 3= greater than 10 years). For each category, we will compute the number of cases, the mean value, and the standard deviation. It would be nice to be able to use the conditional functions such as:

@COUNT(@IF(EX < 2),D5. . . D24)
@AVERAGE(@IF(EX < 2),D5. . . D24)
@STANDDEV(@IF(EX < 2),D5. . . D24)

Alas, these expressions still have not been implemented. We will, therefore, use three columns (i.e., one for counting the number of occurrences, one for finding the mean value, and one for

TABLE 9.2C

INCOME BY YRSEMP, ANALYSIS OF VARIANCE-continued

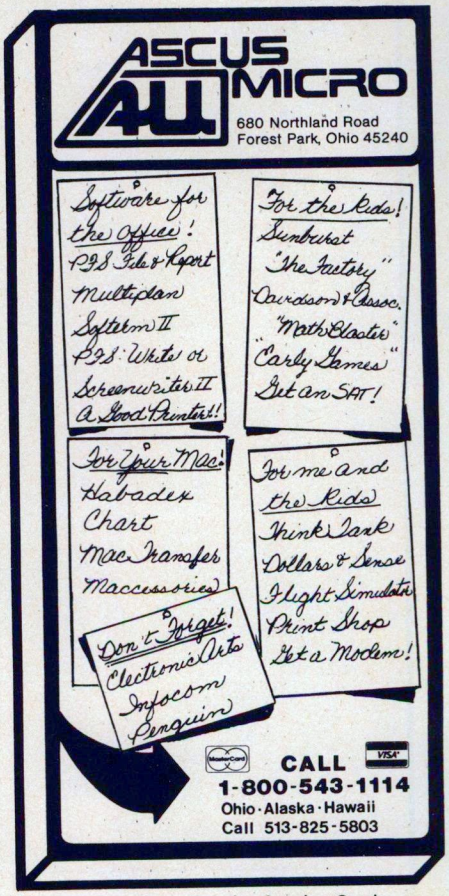
	I	J	K	L
1	Template	for	F-Max	Statistic
2	---------	--------	---------	----------
3		Hartley'	s F-MAX	Test
4	=========	========	=========	==========
5	Value	Variance	F-Max	Signif.
6	---------	--------	---------	----------
7	Maximum	+I22	+J7/J9	+K38
8				
9	Minimum	+I31		
10				
11	df	@MAX(B27.E27)-1		
12	---------	--------	---------	----------
13	Note:	If sig.	= 1, then	not sig.
14	=========	========	=========	==========
15	Maximum		LOOKUP	
16	Variances		for C.V.	
17	---------		---------	
18	@IF(@ISNA(B9),0,B9^2)		Crit V.05	
19	@IF(@ISNA(C9),0,C9^2)	---------	---------	
20	@IF(@ISNA(D9),0,D9^2)		@IF(G21=2,@LOOKUP(J11,B54.B66),0)	
21	@IF(@ISNA(E9),0,E9^2)		@IF(G21=3,@LOOKUP(J11,D54.D66),0)	
22	@MAX(I18...I22)		@IF(G21=4,@LOOKUP(J11,F54.F66),0)	
23		Max@.05=	@MAX(K20...K22)	
24	Minimum		---------	
25	Variances		Crit V.01	
26	---------		---------	
27	@IF(@ISNA(B9),1E33,B9^2)		@IF(G21=2,@LOOKUP(J11,J54.J66),0)	
28	@IF(@ISNA(C9),1E33,C9^2)		@IF(G21=3,@LOOKUP(J11,L54.L66),0)	
29	@IF(@ISNA(D9),1E33,D9^2)		@IF(G21=4,@LOOKUP(J11,N54.N66),0)	
30	@IF(@ISNA(E9),1E33,E9^2)	Max@.01=	@MAX(K27...K29)	
31	@MIN(I27...I31)		---------	
32		Finding	Level of	
33		Signi	ficance	
34		---------	---------	
35		default=	1	
36		.05 test=	@IF(K7>K23,.05,1)	
37		.01 test=	@IF(K7>K30,.01,1)	
38		Min sig =	@MIN(K35...K37)	
39		---------	---------	
40		This is	for F-max	

finding the standard deviation) for each category of the explanatory variable. First we will compute the number of cases in our usual two step manner. In cell H5, we will use: @IF(E5<**2,1,0**), /Reproduce the formula through cell H24, and @SUM the number of zeroes and 1's in cell H31. In column I, we shall list the actual value of income where the number of years employed is less than 2 with the expression in cell I5: @IF(E5<2,D5,0), /Reproduce this equation through cell I24, @SUM (I5...I24), and in cell I32 find the mean value with +I31/H31. In column J, we shall compute the standard deviation of income values for those faculty with less than 2 years of service by using the equation: @IF(E5<**2,(D5-I32)²** ,0), /Reproduce this equation through cell J24, @SUM(J5...J24) in cell J31, compute the variance in cell J34 with J31/(H31-1), and the standard deviation in cell J35 with @SQRT(J34). With several slight modifications, we can then compute these summary statistics for the other two categories (e.g., where the number of years employed was between 2 and 10, and where the number of years employed was greater than 10 years). With these three data values for each category and for all the cases combined—which we have in cells D28, D32, and D35—we can use our new template.

Building an ANOVA Template

If you recall from last time, we completed the construction of a general template for working with contingency table analysis. In this template we included a data entry table for two variables where each may have as many as four attributes. We also reserved space for computations and reporting statistics. We shall follow a similar strategy for our ANOVA template—i.e. we shall structure the template to handle as many as four different attributes or categories of the explanatory variable, develop summary tables, and reserve space immediately below each summary table for all essential calculations.

Columns A through F, rows 8 through 10, are used for data entry: i.e., mean, standard deviation and number of cases values. Rows 19 through 23 are used to check to see how may different categories or attributes are used in this particular analysis. Then, in cell F12, a check is made to validate that you have entered the three summary statistics of mean, standard deviation and number of cases, for each attribute. If you have all three, then @NA will appear; if you have omitted any of them, then, @ERROR will appear in this cell. Similarly, in row 27, the number of cases for each category is listed. Then, in cell G12, a check is made to validate that the sum of the number of cases of all attributes is



Circle 55 on Reader Service Card

TABLE 9.2D

INCOME BY YRSEMP, ANALYSIS OF VARIANCE-continued

	N	O	P	Q	R	S
1		Template	for	Analysis	of	Variance
2	---------	---------	---------	---------	---------	---------
3	A.N.O.V.A	. Table	for:	INCOME	by	YRSEMP
4	=========	==========	==========	==========	=========	=========
5	Source	SS	df	Mean Sqr.	F-value	Signif.
6	---------	---------	---------	---------	---------	---------
7	Explained	+N21	+G23-1	+Q7/P7	+Q7/Q9	+R33
8						
9	Unexplain	+N23	@SUM(B27.E27)-G23	+Q9/P9		
10						
11	Total	+N22	+F10-1			
12	---------	---------	---------	---------	---------	---------
14	=========	==========	=========	==========	=========	=========
15	Sum of	Squares			F-test	
16	---------	---------	---------	---------	---------	
17	@IF(@ISNA(B8),0,(B8-F8)^2*B10)			Sum.val.	F-value	
18	@IF(@ISNA(C8),0,(C8-F8)^2*C10)			---------	---------	
19	@IF(@ISNA(D8),0,(D8-F8)^2*D10)			df(num)=	+P7	
20	@IF(@ISNA(E8),0,(E8-F8)^2*E10)			df(den)=	+P9	
21	@SUM(N17...N20)	=Expl.Vr		F-value=	+R7	
22	@IF(@ISNA(F9),0,F9^2*(F10-1))	=Tot.Var		---------	---------	
23	+N22-N21	=Unexpl.		a-values	F-ratio	
24				.196854	@IF(R21<1,R20,R19)	
25				.115194	@IF(R21<1,R19,R20)	
26				.000344	@IF(R21<1,1/R21,R21)	
27				.019527	2/9/R24	
28					2/9/R25	
29					@ABS(((1-R28)*(R26^(1/3)))-1+R27))/ @SQRT(((R28*(R26^(2/3)))+R27))	
30					@IF(R25<4,R29*(1+((.08*(R29^4))/ (R25^3))),R29)	
31					.5/((R30*Q27+Q26*R30+Q25*R30+1)^4)	
32					@ROUND(R31,4)	
33				Signif=	@IF(R21<1,(1-R32),R32)	
34				---------	---------	

TABLE 9.3B

```
          INCOME BY YRSEMP, ANALYSIS OF VARIANCE-continued
=================================================================

      I        J        K        L        M

 1  Template   for      F-Max  Statistic
 2  ---------------------------------------------
 3          Hartley's  F-MAX  Test
 4  ===================================
 5  Value    Variance   F-Max   Signif.
 6  -----------------------------------
 7  Maximum   43447477 5.425935        1
 8
 9  Minimum   8007372.
10
11  df                7
12  -----------------------------------
13  Note:    If sig. = 1, then not sig.
14  ===========================================
15   Maximum            LOOKUP
16  Variances          for C.V.
17  ---------          ---------
18   43447477          Crit V.05
19   33288630-------------------
20   8007372.                  0
21         0                6.94
22   43447477                  0
23             Max@.05=      6.94
24   Minimum            ---------
25  Variances          Crit V.01
26  ---------          ---------
27   43447477                  0
28   33288630               12.1
29   8007372.                  0
30       1E33 Max@.01=      12.1
31   8007372.           ---------
32             Finding Level of
33               Significance
34             ------------------
35             default=         1
36             .05 test=        1
37             .01 test=        1
38             Min sig =        1
39             ------------------
40             This is for F-max
-----------------------------------------------------------------
```

equal to the total number of cases reported in cell F10.

In columns I through L, a test of the ratio of the maximum/minimum variances is made. The procedure is called the F-max test (Champion, 1970: 122–124). In column I, rows 18 through 21, valid variances are reproduced automatically. Finding the maximum variance is easy with the @MAX function (see cell I22). Finding the minimum variance follows the same general strategy with one exception—where no valid standard deviation values exist, an arbitrarily high value (i.e., 1E33) is entered. We can then find the true minimum value with the function @MIN(I27...I30) in cell I31. The maximum and minimum values are reported in column J. The F-max value is computed from the ratio of the maximum/minimum variances or cells J7/J9 and reported in K7.

Next, the degrees of freedom are calculated from the greatest category number of cases, i.e., greatest n of cases – 1. With the F-max value and degrees of freedom in hand, and the F-max critical values at the .05 and .01 levels of significance via the @LOOKUP function, we can determine if the variances are similar to each other or are reliably different from one another. The computed F-max value is compared with the critical values (column K, rows 35 through 38) and the most extreme level of significance is reported in cell L7. See Table 9.2.

The ANOVA summary table is reproduced in column N through S. It is pretty well documented. The sum of square values are computed in column N, rows 17 through 23. These values are then reported in the summary table, divided by their appro-

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```
1000  REM sample listing
1010  COMPILE
1020  PERFORM "INPUT DATA"
1030  REPEAT
1040    PERFORM "DATA CHECK"
1050    WHEN A > 100 THEN
1060      PRINT "BIG NUMBER"
1070    ELSE
1080      PRINT "SMALL NUMBER"
1090      A=A+1
1100    ENDWHEN
1110  UNTIL A > 200
1120  END

1130  DEFINE "INPUT DATA"
1140    REM  this is a dummy
1150    REM      procedure
1160  FINISH

1170  DEFINE "DATA CHECK"
1180    REM so is this
1190  FINISH
```

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TABLE 9.3A

INCOME BY YRSEMP, ANALYSIS OF VARIANCE

	A	B	C	D	E	F	G
1	Template	for	Analysis	of	Variance		
2							
3		Data	Entry	Table:	Income by Yrsemp		
4							
5	Variable	Attr.	Attr.	Attr.	Attr.	Total Y	
6	Dimension	0 & 1 yrs	2-10 yrs	>10 yrs.	#4		
7							
8	Mean	15009.33	16874.75	17322.5	NA	16449.45	
9	Stand. Dev	6591.47	5769.63	2829.73	NA	5174.8	
10	N of cases	6	8	6	NA	20	
11							
12	Enter !! when finished entering all values.					NA	NA
13							
14							
15							
16	Computational	Space	Number of indep't variables				
17							
18						Total	
19	Mean	1	1	1	0	3	
20							
21	St. Dev.	1	1	1	0	3	
22							
23	N of Cases	1	1	1	0	=>	3
24							
25				Number of cases.			
26							
27	N of Cases	6	8	6	0	20	
28	check sum						
29							

TABLE 9.3C

INCOME BY YRSEMP, ANALYSIS OF VARIANCE-continued

	N	O	P	Q	R	S
1		Template	for	Analysis	of	Variance
2						
3	A.N.O.V.A. Table	for:		INCOME	by	YRSEMP
4						
5	Source	SS	df	Mean Sqr.	F-value	Signif.
6						
7	Explained	18463955	2	9231977.	.3200784	.7343
8						
9	Unexplain	4.9033E8	17	28842858		
10						
11	Total	5.0879E8	19			
12						
13						
14						
15	Sum of Squares			F-test		
16						
17	12443616			Sum.val.	F-value	
18	1447041.					
19	4573298.			df(num)=	2	
20	0			df(den)=	17	
21	18463955	=Expl.Vr		F-value=	.3200784	
22	5.0879E8	=Tot.Var				
23	4.9033E8	=Unexpl.		a-values	F-ratio	
24				.196854	17	
25				.115194	2	
26				.000344	3.124234	
27				.019527	.0130719	
28					.1111111	
29					.6243971	
30					.6253462	
31					.2657152	
32					.2657	
33				Signif=	.7343	
34						

priate degrees of freedom, and the F-value is computed. The F-value and degrees of freedom are then used in our familiar F-distribution approximation to find the level of significance, which is reported in cells R34 and S8. All these computations are based on our previously discussed formulae (see Blalock, 1979; Kerlinger and Pedhazur, 1973).

To help you check your template, I have included in Table 9.3 the worked values for average income by three categories of years of employment. Go ahead and check your results, then try some other data sets.

Conclusion

As we have noted on several occasions, ANOVA is a test of the two most extreme mean values. It is often important to examine which attributes are reliably different from other attributes beyond those attributes with the most extreme mean values. To accomplish this goal, we will need to consider two additional procedures. Next time we will examine the most appropriate procedures for making comparisons between mean values (i.e., Tukey's HSD procedure), and contrasts of means (i.e., t-tests). See you then.

References

Blalock, Humber M. Jr. *Social Statistics: Revised Second Edition.* New York: McGraw Hill Book Co. 1979.

Champion, Dean. *Basic Statistics for Social Research.* Scranton, PA.: Chandler Publishing Co. 1970.

Kerlinger, Fred N. and Elazar J. Pedhazur. *Multiple Regression in Behavioral Research.* New York* Holt, Rinehart and Winston, Inc. 1973.

Norusis, M.J. *SPSS Statistical Algorithms, Release 8.* Chicago, Ill: SPSS Inc. 1979.

Runyon, Richard P. and Audrey Haber. *Fundamentals of Behavioral Statistics.* Reading, Mass.: Addison-Wesley Publishing Co. 1976.

A.P.P.L.E. Doctor

Bruce F. Field

A SWITCH IN TIME

A couple of folks wrote in to correct one of my answers on adding a switch to your disk drive to allow writing on protected diskettes (diskettes that have the little write protect sticker over the notch). An additional switch should be wired in parallel with the existing switch. Don't disconnect either of the wires going to the existing microswitch in the drive, but bring the two wires out to an additional switch. When this extra switch is closed you will be able to write on any diskette whether it is write protected or not. I apologize for getting my original information from the manual rather than disassembling a drive and testing the switch.

Mark IV Designs, 2315 S. Canterbury, Lincoln, NE 68512, (402) 423-0363 sells a switch for the mechanically disinclined ($44.95) that requires no cutting or soldering.

Adding a switch to defeat the write protection will also permit you to write on the reverse side of a diskette (insert it in the drive upside down) without cutting an extra notch in the diskette. There has been considerable discussion on whether the reverse side of a disk should be used, so I report this only in the interest of completeness without including my opinion that you shouldn't use the back side of a diskette anyway.

//e 80-COLUMNS WITH MODEM

Murphy Sewall in Storrs, Connecticut wrote to report that there is a serious problem in using the //e 80-column card with a modem program.

"The problem, quite simply, is that the standard ready to receive communication code (X-ON or Control-Q) causes the 80-column card to display 40 columns. The X-ON/X-OFF sequence is exchanged rather frequently in communication, especially with mainframe computers.

Any communications program that is going to operate properly with the //e's 80-column card must either bypass the card's firmware or filter (discard) Control-Q before it reaches the screen driver.

I bought my Apple //e in large part to use at 1200 baud with a University mainframe. I was extremely frustrated in May '83 when I discovered that none of the communications software at local dealers would function with the //e 80-column card. I later discovered that Softronic in Memphis had solved the problem in February 1983 by bypassing the card's firmware. Other software vendors didn't get satisfactory software written until August 1983 or later."

As Murph points out, the moral of this story is to make sure your communications software takes care of this problem if you want to use 80-columns.

MULTIPLAN AND THE //c

Terry Prudden called to say that Microsoft's Multiplan version 1.06 will not print properly with the Apple //c although it works fine with the //e. Version 1.07 has been released to correct this problem.

MOUSEPAINT PRINTOUT

Q. *We have both an Apple II+ and a //e. We use an NEC 8023 printer for all. We would like to add a mouse and Mousepaint to our system. However, I was told that Mousepaint only supports the Imagewriter. How can I get Mousepaint to dump to my printer? We have an SSM APIC parallel card and accompanying screen dump. Can you help?*

A. It is true that Mousepaint was designed to work only with the Imagewriter. There is a way, albeit clumsy, around this problem. After you have finished creating your picture, save it to disk. Exit Mousepaint and BLOAD your picture back into memory with BLOAD YOUR PICTURE NAME.PIC,A$2000. Mousepaint automatically appends .PIC to the name you specify for your picture. Now type PR#1 (if your printer interface card is in slot 1) and type the command your card requires to dump Hi-res screen 1 to the printer. The Hi-res dump command can be found in the printer interface card manual, the SSM APPIC manual.

If you are somewhat adept at disassembling machine code it should be possible to modify Mousepaint to work directly with the NEC 8023 or the C. Itoh 8510 Prowriter. Pretty much the only difference between these printers and the Imagewriter is that the NEC and C. Itoh require ESC S before graphics characters and the Imagewriter requires ESC G. A friend of mine went through Mousepaint and found a table

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of escape sequences near the end. He changed the ESC G to and ESC S and found he could then print directly to the NEC printer from Mousepaint. He also noticed that after printing the menus in Mousepaint were all messed up. This might be worth some further study.

PROBLEM PADDLES

Q. *I am using Kraft paddles with my Apple II+. The readout from both paddles is unstable and they interact with each other. Without rotating the knob a paddle may read 150 one second then 148 the next and 151 the next. When both paddles are called from a program the readouts are not only unstable but also interact with each other, so that rotating one control not only affects it's readout but also the readout of the other paddle.*

I have used the paddles with many programs and my own which contain lines which read as follows:

```
10  PRINT PDL(0)
20  FOR I = 0 TO 10:NEXT I
30  PRINT PDL(1)
40  GOTO 10
```

Would you tell me how to get the paddles to operate properly?

A. There may be a couple of problems here. Any time you take a continuously variable device (a paddle) and convert it's output to a digital number there is an uncertainty of plus or minus one in the last digit. The paddle may be set exactly halfway in between the two numbers and noise in the system will cause it to flip back and forth between them. You can expect the numbers to jump around some but the question is how much, and I think that 3 steps in a short period of time is too much. It could be that your paddles simply are getting old and noisy. If you can borrow some paddles from a friend, try them and see if they also jump around. Alternatively you could have a problem with the paddle timer chip in your Apple. This is a relatively inexpensive chip that is available from most electronics supply houses. What you want is a 558 Quad timer chip, and it is located at the rear of the motherboard on the right hand side (location H13).

The second problem, of paddle interaction, may be due to defective paddles or a timer chip, but may also be a software problem. When you use the PDL function of Applesoft the Apple sends a strobe to the timer chip which starts it timing ALL the paddle inputs. Four outputs (one for each of the possible paddles that can be connected) are turned on and read by the Apple. After a length of time that depends exactly on the setting of the paddle knob, the signal for that knob turns off. The Apple counts the length of time that signal is on for the paddle you are trying to measure. If the first paddle we read returns a low number the time is very short and the signals from the other paddles may still be turned on. If we then try and read one of the other paddles we will get a completely wrong number. You need to wait a short period of time to let all the paddles "time out" before reading a second one. Three or four milliseconds should be enough time. The FOR – NEXT loop in your program above takes about 17 milliseconds to execute and should provide more than enough time. Thus I think you should look at your hardware, either the paddles or the timer chip.

HI-RES SCRIBE DUMPING

Q. *I have an Apple IIc. How can I dump the hi-res graphics screens to the new Apple Scribe printer?*

A. The IIc doesn't have software built-in to dump the hi-res screens so you will have to purchase a program to do this. I believe the latest version of the Printographer from Roger Wagner Software (aka Southwestern Data Systems) supports the Scribe and IIc. Other programs will probably be available by the time you read this.

GAME PORT CONNECTIONS

Q. *Plugging some peripherals into the game port in a IIe seems to mess up some Apple operations in a different way than the II+. For example, control-RESET causes a re-boot of the system and messes up Appleworks. What are the differences between the game ports of the II+ and IIe that cause this?*

A. The difference is that two additional keys on the IIe keyboard, the OPEN-APPLE and SOLID-APPLE keys are connected to pushbutton 0 and 1 inputs on the game I/O port. They are do not send a code to the Apple when they are pressed as the other keys do. When control-RESET is pressed the Apple checks to see if either of these two keys are pressed. If the OPEN-APPLE key is pressed at the same time, then the Apple first destroys any program or data in memory by writing two bytes of arbitrary data into each page of the memory. Then a normal cold-start reboot is performed (as if you had turned the computer off and then on again). If the SOLID-APPLE is pressed during RESET the Apple runs a self test program to check memory.

The game I/O pushbuttons are wired in more or less in parallel with these keys, so if you have a peripheral where the buttons are held down, whenever you want to do a control-RESET you will get either a self-test or a cold-start reboot. Regular Apple paddles can be connected and won't interfere with RESET as long as the buttons aren't pressed, but don't let your paddles get buried under a lot of books or you could accidentally have a button pressed and do a reboot when you try and RESET.

Something Over 32 Bits

Question & Answers About Apple's Lisa and MacIntosh 32-Bit Computers

Dave Redhed

What is this strange formula associated with a GET in Microsoft BASIC for Mac? It is on page 88 of the version 1 manual and page 147 of the version 2 manual.

Since Microsoft did not create a new type of variable to hold a portion of the screen display, they have provided a way to store the information into an integer, single precision real, or double precision real array. The formula given is that which is required to calculate how many bytes are required to hold a sccreen rectangle of any given size. They do not show where the formula came from nor do they bother to put it in symbolic form, but we must assume that it is valid.

If you wish to GET a screen portion which has a top left coordinate of XL, YT and a bottom right coordinate of XR, YB, the formula would be,

4+(YB-YT+1) x 2 x INT((XR-XL+16)/16)

The actual number of bits in the screen image is just the product of the two sides of the rectangle, (XR–XL+1) x (YB–YT+1). The constant of 16 shows up because the computer is organized around 16 bit words in memory. If the portion of screen memory uses any part of a 16 bit word, the whole word has to be included in the array. The memory words have to be taken into account only in the horizontal direction because of the way that the screen is mapped into memory.

Taking the sample problem in the document (XL=10, YT=20, XR=30, YB=40), the image contains 21 points in both directions for a total of 441 points (bits). The expression in the INT function yields a value of 2, which implies that it takes two, 16–bit words to hold 21 bits of information. The extra factor of two in the formula accounts for the fact that there are two bytes in each 16 bit word. I can only assume that the extra 4 bytes represents some constant overhead for the storing of the screen image. So, 4 + (21 x 2 x 2) = 88 bytes. This is a total of 704 bits to hold the 441 bits of the screen image. Obviously the two numbers would be quite a bit closer if the dimensions of the rectangle were different. No more storage would be required as long as the right coordinate were less than or equal to 41. Since you bite off storage in 16–bit chunks in the horizontal direction, it pays to take some care in choosing the horizontal dimension of the display you save.

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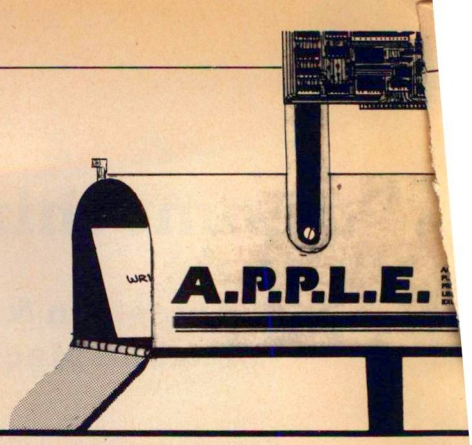

Readers' Forum

Neurotic Computer?

Does your Apple *II*c have an identity crisis? Type in the following program and run it:

```
10    HOME
20    PRINT "I know you think I'm an
      ";
30    FOR I = 64771 TO 64779:
      PRINT CHR$ ( PEEK (I));: NEXT
      I: PRINT
40    PRINT "But I think I'm an ";
50    FOR I = 64265 TO 64273:
      PRINT CHR$ ( PEEK (I));: NEXT
      I: PRINT CHR$ (7)
```

The *II*c monitor is *very* different!

Bob Bragner
Kandilli, Iskele Caddesi 49/3
Istanbul, Turkey

Premium Softcard Trade-offs

The following information may be useful to anyone considering purchasing or upgrading to the new premium Softcard from MicroSoft:

The new premium card operates with a 6MHz clock. This results in a much faster system, but also necessitates a different approach to I/O. Programs such as Z–Term will no longer be usable and, according to the manufacturer, there is no patch available to fix the problem. The Synatix RAM disk drivers will not run under the new system. A call to Synatix did not result in any commitment to write new drivers.

Some programs may not run properly. The BDS C compiler would crash the system after the second pass of the compiler. The problem appears to be in the implementation of version 2.23, also known as the 60k version. Fortunately, BDS offers a patch that performs a warm boot rather than returning to the CCP which solved the problem. Some programs, such as WordStar, that had been previously configured on a 56k system had to be reconfigured before they ran properly.

The old ctrl–O and ctrl–N commands for inverse video are no longer supported. Since the ctrl–O interfered with some printers, such as the Epson, this is probably not a bad deal, but did necessitate some rewriting of some dBASE programs.

Overall, the performance of the new premium card is significantly superior to the older Softcard running at 2 MHz. However, as seems to always be the case, there are some trade–offs that must be considered.

Sincerely,

James A. Nelson
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THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E.

MACCOLBY—A RUGGED AND PORTABLE MACINTOSH

Mountain View, CA — Colby Computer has begun production of a new self-contained, ruggedized, transportable Macintosh. The MacColby case is designed for industrial and military markets and for use in businesses in which personnel transport their Macs from home to office and to outside meetings,. It will slide easily under an airline seat, and can be carried in its optional foam-lined Cordura carrying case.

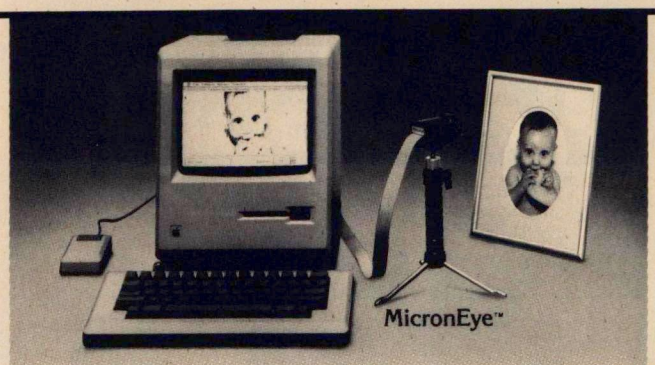
Colby Computer strips the Macintosh, its keyboard, its modem, and disk drive of their Apple supplied cases and houses them in the new MacColby case which consists of an internal aluminum case and an outside plastic case. An added built-in fan provides pressurized, filtered air that circulates the air and provides positive pressurization. A mesh screen covering the monitor reduces unnecessary glare.

The MacColby has many options:

1. a built-in second disk drive;
2. a built-in modem
3. a built-in video output capability
4. a built-in 12 volt adaptor
5. a mouse house area to store the mouse
6. the Supersecure Colby Code system
7. a built-in hard disk system, along with other features not available in the standard Mac.

To pack a MacColby, simply snap the keyboard onto the front unit, insert the mouse in the "mouse house," unplug the wall plug, tilt the handle up and away you go with a standard Mac! The unit weighs 26 pounds and measures 8¼ H x 16½ W x 17½ D.

The new MacColby is available as a conversion unit for dealers to be able to convert customer's Macs or as a completely assembled and tested system—ready to go from Colby Computer. Prices: $499 (introductory offer) for a conversion unit; complete systems for $2699 (128K unit) to $3699 (512K unit). For further information, contact: *Colby Computer, 849 Independence Avenue, Mountain View, CA 94043 (415) 968-1410.*



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Full screen images as shown above may be created by making and combining two separate camera scans.

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The MicronEye™ is available with immediate delivery for your Macintosh. It comes complete with tripod, lens, hardware, software and user's guide.

The MicronEye™ is also available for these computers: Apple II, IBM PC, Commodore 64, TRS-80CC and TI PC (trademarks of Apple Computer, Inc., International Business Machines, Commodore Corp., Tandy Corp. and Texas Instruments respectively.)

*(Add $10.00 for shipping and handling [Federal Express Standard Air]; residents of the following states *must add sales tax:* AK, AZ, CA, CO, CT, FL, GA, IA, ID, IL, IN, LA, MA, MD, ME, MI, MN, NC, NE, NJ, NY, OH, PA, SC, TN, TX, UT, VA, VT, WA, WI.)

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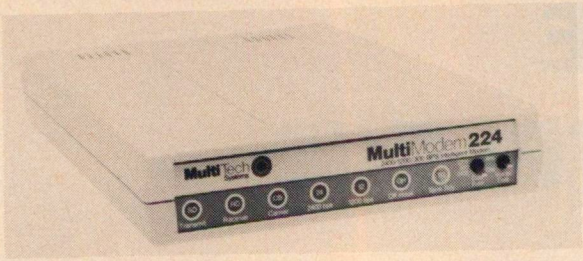

Multi-Tech Systems announces The MultiModem 224, a multiple speed full duplex product that operates at 2400, 1200, or 300 baud. The intelligent MultiModem 224, compatible with all the important modem standards used in personal computing and terminal data communications, is priced up to 30 percent lower than competitive offerings.

By offering all three speeds, the MultiModem 224 provides users the versatility to grow into the higher performing applications while still being able to use traditional line speeds. The MultiModem 224 permits 2400, 1200, or 300 baud operation with manual or automatic dialing, asynchronous or synchronous operation over both dial-up and two wire leased lines. Its intelligent features include autodial, automatic answer, Hayes command compatibility, call progress detection, and a phone number memory.

At 2400 bps, the MultiModem 224 is V.22bis compatible, at 1200 bps it is Bell 212A compatible and at 300 bps it is Bell 103 compatible. The MultiModem can communicate with virtually all data bases and information services today and is equipped to handle all future ones.

Multi-Tech products are sold through a national network of distributors, manufacturing representatives, system integrators, value-added resellers and retailers. The company is located at *82 Second Avenue S.E., New Brighton, MN 55112 (612) 631-3550, TWX 910-563-3610.*

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INTERNAL HARD DISK FOR MACINTOSH

Cambridge, MA — General Computer Company has introduced HyperDrive, a hardware upgrade system for the Apple Macintosh which dramatically increases its speed and power. HyperDrive is the only Macintosh upgrade combining an internal 10 Mbyte hard disk drive and memory expansion to 512K RAM.

A HyperDrive Mac loads and starts programs three times faster, and transfers programs and data up to twenty times faster than a standard Macintosh. Its 10 megabyte disk drive stores twenty-five times more data than a Macintosh diskette.

Because HyperDrive's disk interface logic board is directly connected to the Mac's main circuit; all Macintosh serial ports remain free for modem, printer, or AppleBus use. This gives HyperDrive-equipped Macs the powerful advantage of booting from either the harddisk or the Mac diskette.

In addition, system software provided with HyperDrive allows the hard disk to divide into many "virtual disks" which automatically re-size themselves to accommodate the user's files. The new units can also transfer data seven times faster than Macs with external hard disk drives.

HyperDrive is available in two models: one with memory expansion to 512K RAM, and one without memory expansion. The cost of a HyperDrive —including 10 Mbyte disk drive and 512K memory expansion, installation, shipping, and a comprehensive warranty—is $2795. Units without RAM upgrade cost $2195. HyperDrive units will be available in early January.

For additional HyperDrive information or a demonstration, contact your nearest Apple dealer or write: *General Computer Company, 215 First Street, Cambridge, MA 02142. Phone: 1-800-422-0101.*

MULTI-PLAYER ADVENTURE CONSTRUCTION SET

Adventure Construction Set (ACS), a new software program that allows a player to design graphic and text adventures that may be played by from one to four players, has been introduced by Electronic Arts. ACS contains three products on a single double-sided diskette: Adventure Construction Set; "Rivers of Light," an adventure set in Egypt and the Near East during the Dawn of Man; and "Land of Aventuria," an adventuring tutorial for novices which contains seven mini-adventures, each one based on a theme or a different kind of game that can be created with the construction set. These mini-adventures, as well as Rivers of Light, may be modified by the player to help learn how to build adventures with ACS.

The player can create characters, define their limitations, supply music and sound effects, and build a wide variety of interior rooms and outdoor play locations. The player has almost complete control of the construction process yet, at any time the computer can be asked to complete an adventure automatically, or to change an existing adventure. Players at any level can learn from the experience... whether the subject is adventure design, problem solution, creative writing, or graphics. Movements are controlled by joystick.

While ACS can be used to build any game one can think of, three different kinds of adventure formats are provided: fantasy and medieval; spies and mysteries; and science fiction adventures. The program supplies a set of graphics, objects, and terrains for each kind of adventure. They can be intermixed in the design of an adventure. It can handle more than 250 different locations, 500 unique creatures and characters, and 5,000 or more treasures, magic items, doors, walls, furniture pieces, weapons, sound effects, musical themes, and other props and enhancements.

At any time a character is created, a prop designed or brought into use, a new twist added to a plot, it is accomplished with the aid of a menu that makes all the technology transparent to the user. All options are always explained to the user in plain English. The computer keeps track of everything, including the developing definitions of the characters, the effects of the different props on the players, and the changing levels of proficiency of each character in the adventure. A unique feature of the game lets a character "learn" as it encounters a situation and either triumphs or fails the test. The likelihood of success in any adventure is determined by a combination of the skills a character has exhibited previously, and its defined abilities.

Sound available for use in adventures includes an overall theme for each type of adventure, snippets of music to use in individual situations or to be combined for longer pieces, and sound effects to be attributed to actions or the use of props, like weapons—with 30 different pieces of music and sound effects in all. Adventures may be saved on disk at any point in their design or play.

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SURVEY

What one computer do you currently use most?

A ☐ *Apple II*
B ☐ *None*
C ☐ *Apple IIe*
D ☐ *Other (specify)*

What hardware product are you most likely to buy in the next 4 months?

E ☐ *Hard Disk*
F ☐ *5 megabyte*
G ☐ *10 megabyte*
H ☐ *20 megabyte*
I ☐ *8086 board for your Apple (run IBM P/C software)*
J ☐ *Apple keyboard (increase capability)*

What computer language would you likely purchase in the near future?

K ☐ MBASIC.MAC
L ☐ PASCAL
M ☐ MODULA 2
N ☐ ADA
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List price: $30 (check or M.O. only). Available from: *JAGWARE, 127 Albany Avenue S.E., Orange City, IA 51041.*

SIMULATION SOFTWARE IMPROVES MANUFACTURING QUALITY

The Process Quality Simulator is a computer tool used to help evaluate the quality of parts being made by a manufacturing process.

The program works by modeling *your* production process—generating units with the same variation, the same bias. The program quickly gives you information which would be very difficult to calculate by hand and eliminates the need of interpolating tables. It's "what if?" capabilities of quickly evaluating alternative actions provide a tool which will help manage the production process more effectively.

PQS uses the latest techniques in Monte Carlo random number simulations. It is user friendly and includes a step-by-step tutorial.

It is intended to be used by people who have to make business and technical decisions about a production process, such as production managers and engineers. You do not need to have formal training in probability or statistics.

Available for Apples II, II+, *IIe*, and *IIc*. Price—$135.00 from *Navone Engineering, 2116 Waterloo Rd., Stockton, CA 95205 (209) 941-2669.*

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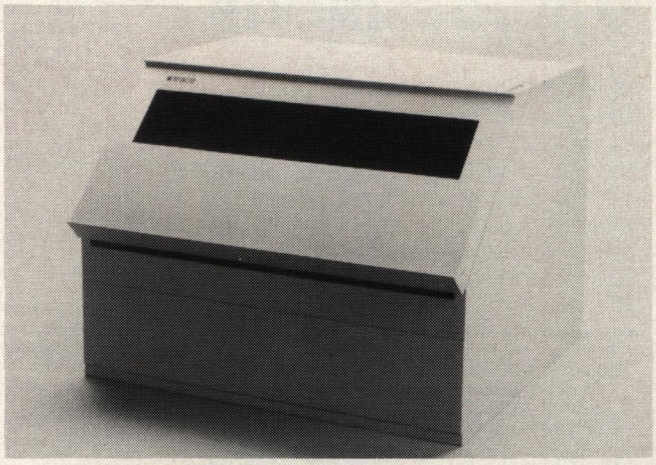
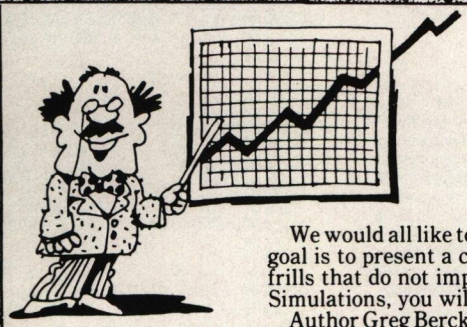


Mountain View, CA — Trace Systems, Inc. has announced a new acoustical enclosure for computer printers, SoundTrap XL. Designed for use with large office printers with tractor or cut-sheet feeders, SoundTrap XL is designed to moderate irritating and distracting printer noise.

SoundTrap XL incorporates a number of special features. In addition to its commodious size, the SoundTrap XL provides two lids for easier access. It incorporates a 45 degree angle top which doubles as a copy stand. Furthermore, the SoundTrap XL is designed to accommodate high power and comes equipped with a special fan. Optional accessories include a capacity increasing base extender unit and a floor stand. The base SoundTrap XL unit will carry a suggested retail price of $449.

Trace also markets SoundTrap 80 and SoundTrap 136, sound enclosures for 80-and 132-column printers. All SoundTrap models are available through computer and office products retailers in the U.S. and Canada. Interested purchasers may contact Trace at *(800) 24-TRACE* or *(415) 964-3115* for the name of their nearest dealer.



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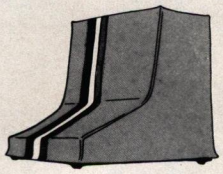

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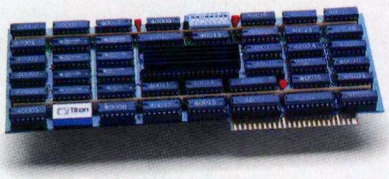

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